GY DEPT.

Coal Age

MARCH 1942

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BIG CARS AND TRANSFER
Boost Loader Output at Peerless

•

DRAGLINE STRIPS RIDER
With Shovels for New Maumee Mine

•

JIGS FOR LARGE SIZES
Feature West Mineral Modernization

•

BETTER POWER FACTOR
How Illinois Mines Have Attained It

•

GOOD MINE SUPERVISION
Company Policy Is a Major Factor

•

FIELD TIPPLE WELDING
Its Advantages and How to Do It

•

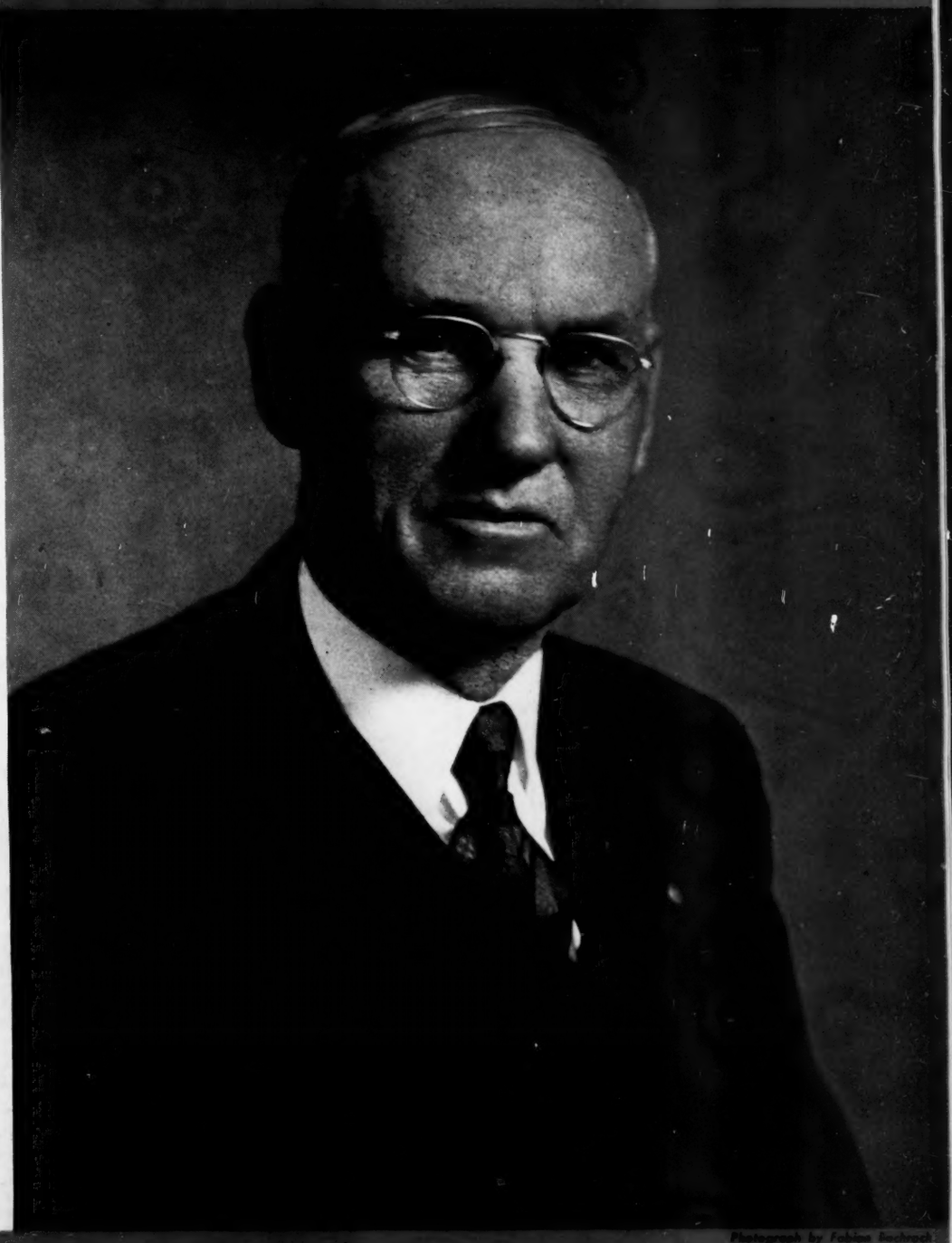
REBUILDING LOCOMOTIVES
Can Result in Big Cost Savings

•

SMALL SHOVELS RECOVER
36 In. of Coal Under 45-Ft. Cover

•

Complete Table of Contents, P. 5



Photograph by Fabian Bachrach

Coal Operator Eugene McAuliffe honored as 1942 A.I.M.E. president

Want Dustproofing That Lasts?

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Dustproofing can be a powerful sales weapon for solid fuels . . . when it provides positive "sealed protection" from mine to furnace door. To provide such lasting protection it must be able to withstand the effects of rain, snow, sun and wind in shipment . . . and perhaps for months in unprotected storage.

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With such proved lasting qualities, is there any wonder that millions of gallons of COALKOTE are used each year by leading mine operators to increase consumer acceptance and build new outlets for their coal, coke and briquettes? For further information, write SUN OIL COMPANY, Philadelphia, Pa.

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Photo Courtesy of
The Fairfield Engineering Co.

SUNOCO

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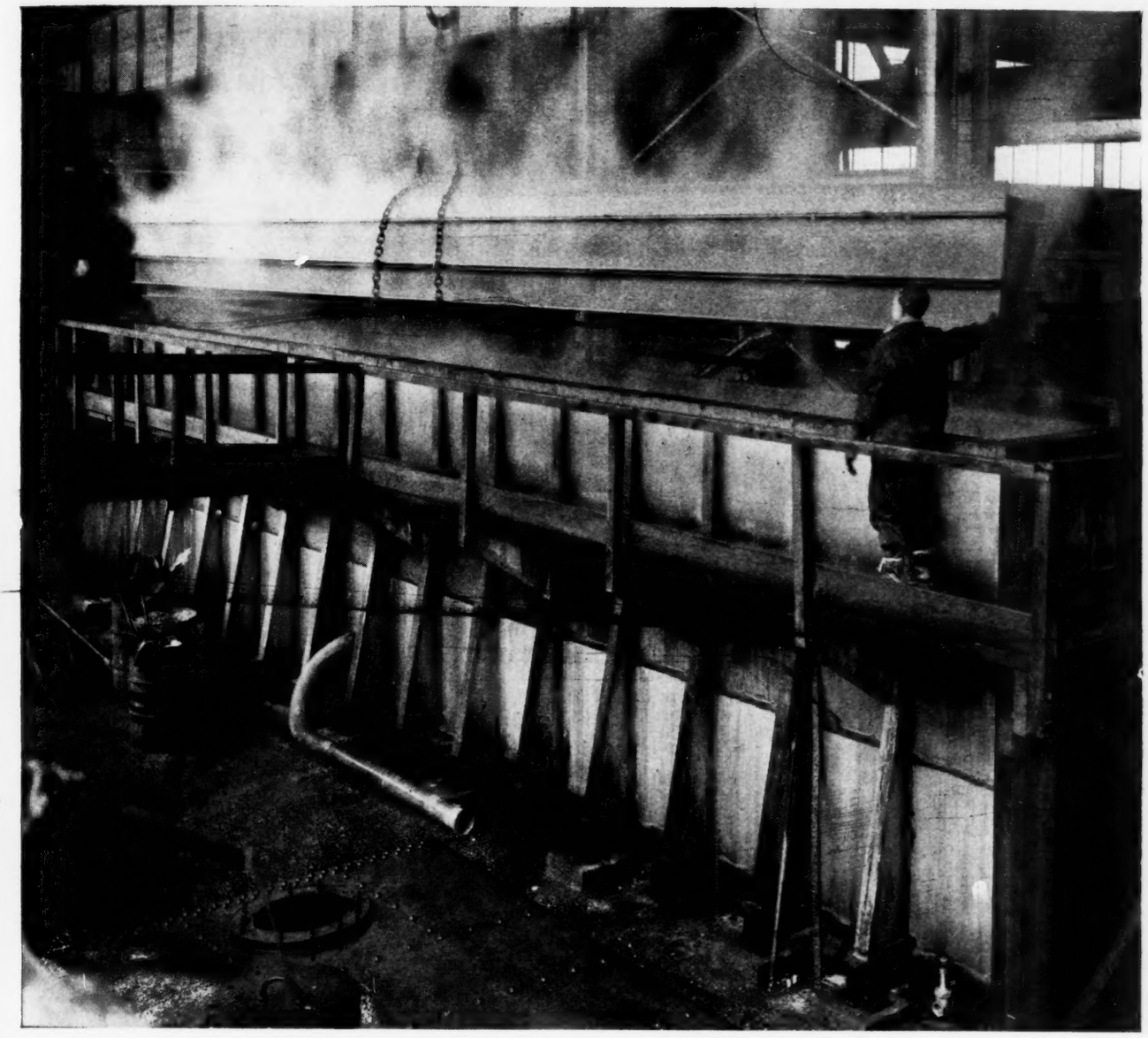

Dipping a battleship's ribs in "fire-water"

A typical example of Goodrich development in rubber

BEFORE 2-ton ribs like these can be built into a battleship, all rust must be cleaned off. Best way to do it is dipping in vats of hot acid that eats off the rust, leaves the steel clean.

But old types of tanks for dipping (called pickling) would be too slow today. Hot acid eats through wood or metal tanks, ceramic tanks crack with the heat. Rubber lined tanks were tried but hard rubber cracked with expansion and contraction from heat, soft rubber was easily damaged. Every one of these tanks had to be shut down frequently for repairs, slowing up construction.

Then B. F. Goodrich engineers developed a steel tank for strength, lined with hard rubber to hold acid, protected by layers of soft rubber and brick sheathing, with a special expansion joint to prevent cracks. That's the tank steel mills have used to prepare sheets for your automobile.

As alloy steels have developed, with more virulent acids used for cleaning them, B. F. Goodrich engineers have developed new compounds to stand these stronger acids even at boiling point.

Today stout ribs for battleships are more important than ever, but delays for tank repairs can't be tolerated. So practically every big steel company and shipbuilding company have these newest Goodrich tanks, assuring uninterrupted service in speeding navy steel that will be clean, safe and sturdy. *The B. F. Goodrich Company, Industrial Products Division, Akron, Ohio.*

B.F. Goodrich

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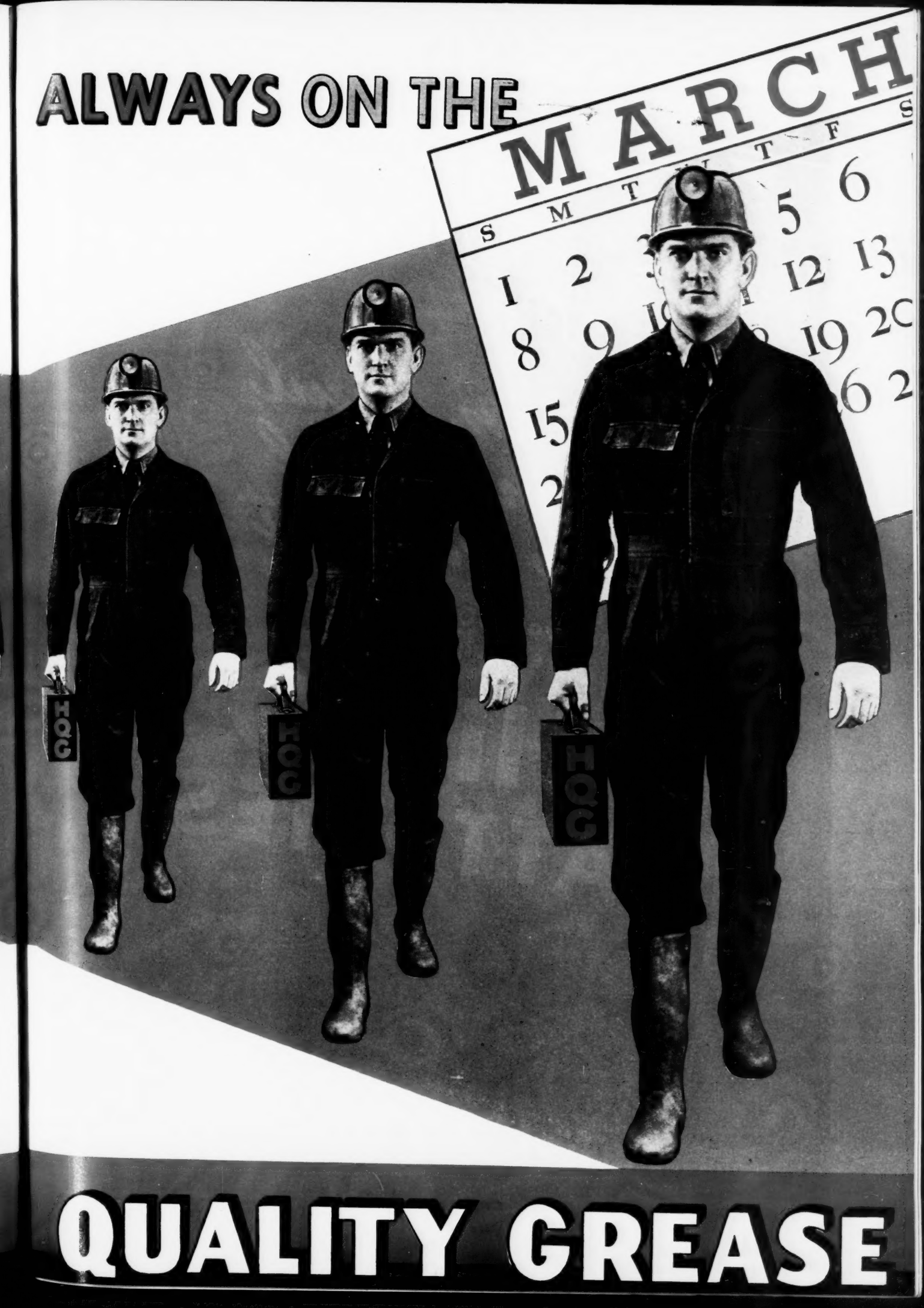
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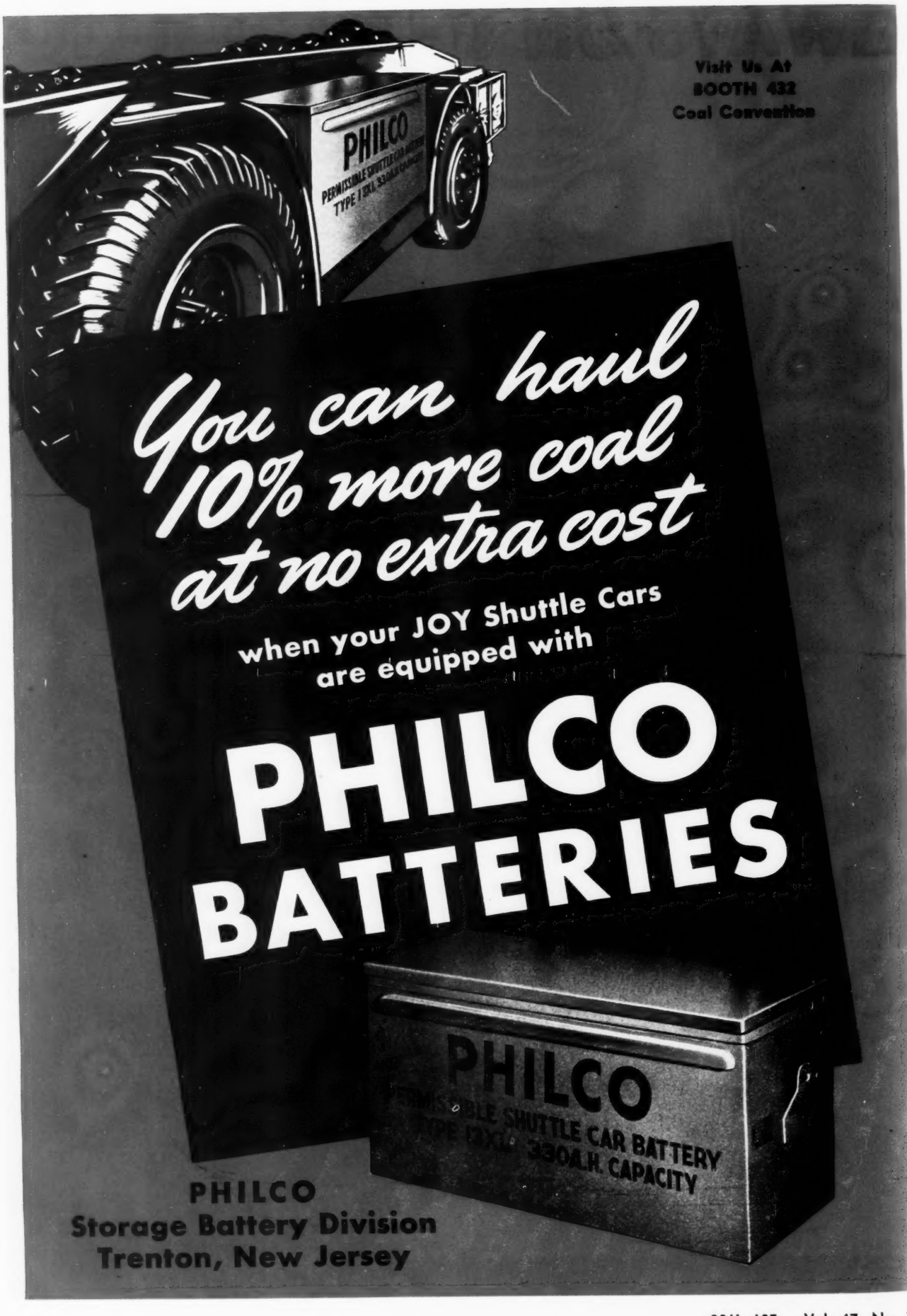
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MARCH 1942 Thirty-Five Cents Per Copy

Coal Age

Volume 47 Number 3

Looking to the future, always an important factor in human affairs, now takes on added importance, and will be a major item in the technical program for the Cincinnati meeting of the American Mining Congress. The program will be an important part of the April Pre-Convention Number of Coal Age. Must reading is a scheduled analysis of some of the problems ahead by Dr. Wilbur A. Nelson, administrator of mine priorities. . . . **Washington** continues to grow in importance as the nerve center of the nation at war. To give our readers a quick picture of outstanding developments, Coal Age inaugurates this month a department devoted to news and views from the national capital. The roundup appears on pp. 35 and 36. . . . **Big cars** have long been advocated as a means of increasing mobile-loader efficiency. How such cars, in conjunction with a transfer station, materially helped the situation at Peerless mine is the subject of an article on p. 37. . . . **Stripping** figures in two articles in this issue. One (p. 40) describes the use of a 14-cu.yd. electric dragline to recover a

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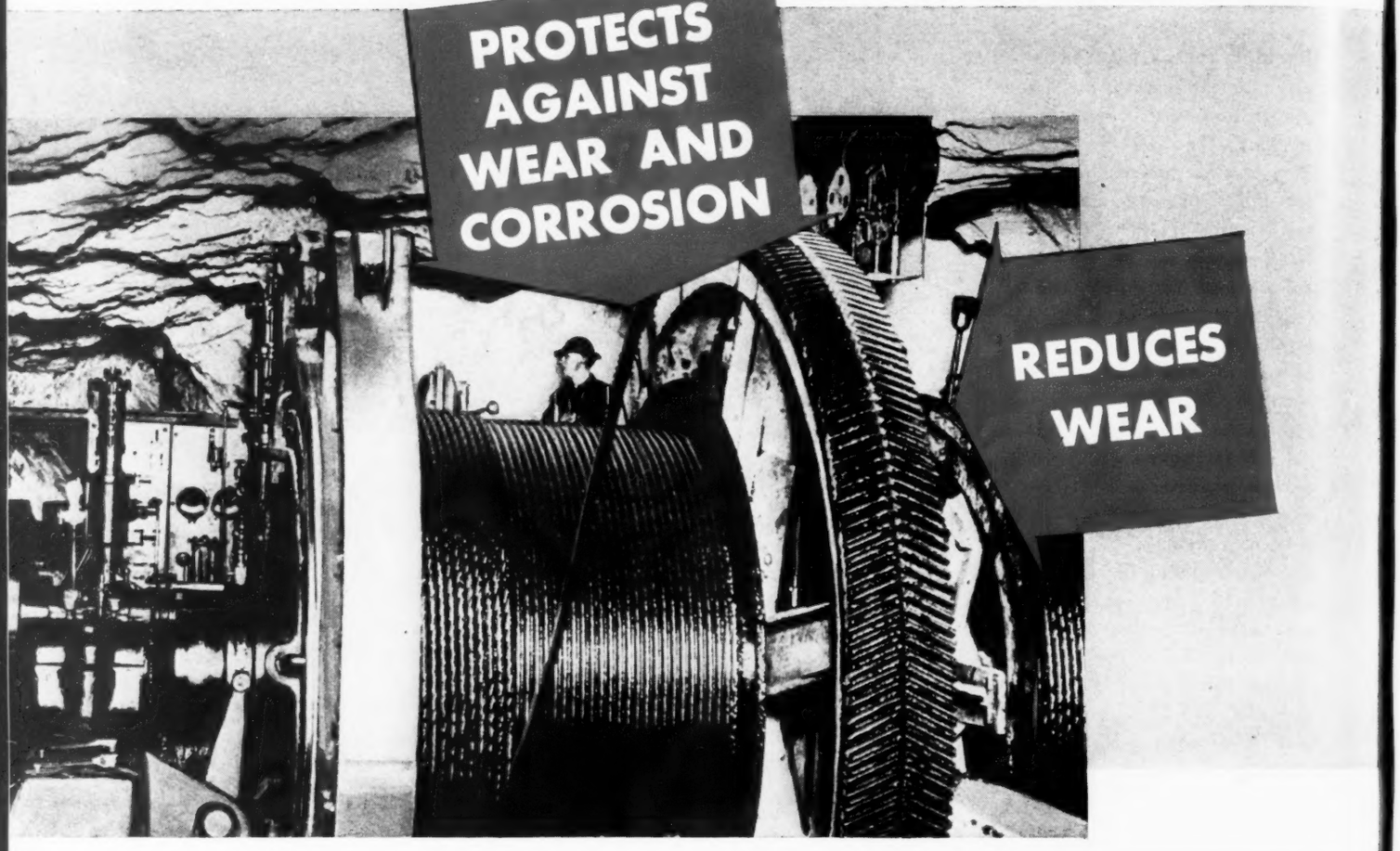
LONGER LIFE for Rope and Gears



YOU, too, can find no better "tonic" to keep your wire rope and open gears quiet and fit for today's 24-hr. service . . . than *Texaco Crater*. It makes them last longer.

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FOR THE COAL MINING INDUSTRY

RETURN METAL DRUMS PROMPTLY ... thus helping to make present supply meet industry's needs and releasing metal for War Ne

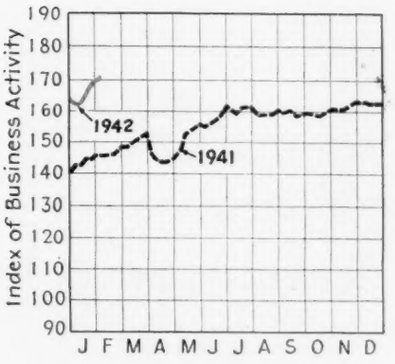
(CONTINUED FROM PAGE 5)

rider seam and summarizes equipment and methods at a new Maumee operation in Indiana. Recovery of a 36-in. seam under 40 to 45 ft. of cover in western Pennsylvania by the Elba Coal Co., Inc., using small shovels, is the theme of the second, p. 58. . . . **Preparation revisions** at the West Mineral plant in Kansas (p. 43), how Illinois mines improve power factor (p. 47), company policy and its effect on good mine supervision (p. 49), field welding of tipples (p. 53), and stocking of coal at Cannelton (p. 61) round out the feature section of this issue. The news includes a summary of papers of interest to coal men presented at the New York meeting of the A.I.M.E. . . . **Mechanical-mining** articles for the future include a complete story on the No. 8 mine of the Old Ben Coal Corporation, in Illinois, plus a detailed description of how a mobile loader, shuttle cars and conveyor are doing a job for the Moore Branch truck mine in Kentucky. . . . Stripping subjects on the fire include a summary of developments at the Fidelity No. 11 mine, in Illinois, including adoption of truck haulage in one pit, installation of a new shovel and conversion of an old stripper into the heaviest dragline in the United States. . . . **Maintenance** articles coming up include a story on the underground shop at No. 93 mine, Consolidation Coal Co., built to speed mobile-loader and locomotive repairs.

HOW'S BUSINESS

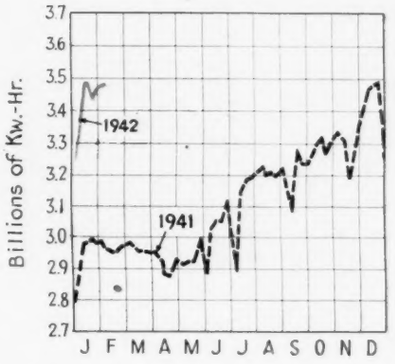
GENERAL BUSINESS CONDITIONS

Axis war successes are quickening transition from peace-time production to arms in this country, with the likelihood that the WPB will order wholesale closing of non-defense durable goods plants in the next few months, followed by a scramble by the latter for war work. Meantime, business activity, according to *Business Week*, has been expanding rapidly, the Index having advanced to 171.0, says the issue of Feb. 14.



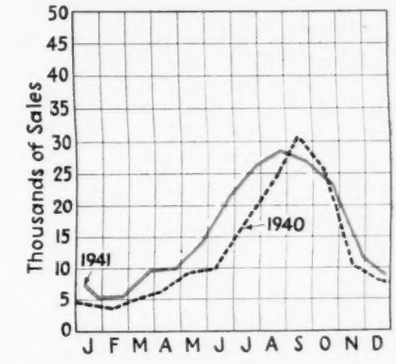
ELECTRIC POWER OUTPUT

Output of electric energy by the electric light and power industry for the week ended Feb. 7, according to the Edison Electric Institute, was 3,474,638,000 kw.-hr., a recovery running counter to the expected seasonal decline and at the same time the highest single week's output in history. Production for other recent weeks was: Jan. 17, 3,450,000,000 kw.-hr.; Jan. 24, 3,440,000,000; Jan. 31, 3,468,000,000 kw.-hr.



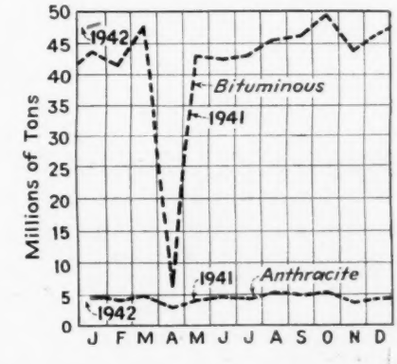
COAL STOKER SALES

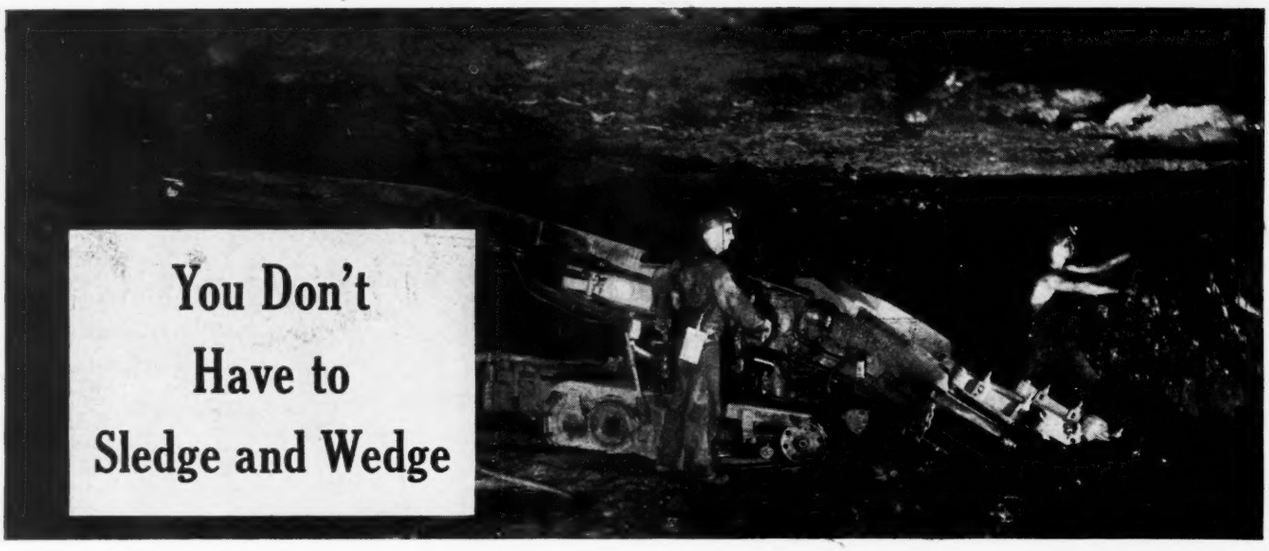
Mechanical stoker sales in the United States in December last totaled 8,592 units (U. S. Bureau of the Census from 101 manufacturers), compared with 10,877 in the preceding month and 6,582 in December, 1940. Sales of small units in December last were: Class 1 (under 61 lb. of coal per hour), 7,274 (bituminous, 6,134; anthracite, 1,140); Class 2 (61–100 lb. per hour), 605 (bituminous, 464; anthracite, 141); Class 3 (101–300 lb. per hour), 424.



COAL PRODUCTION

Bituminous coal produced by United States coal mines in January last (preliminary) totaled 48,540,000 net tons, according to the Bituminous Coal Division, U. S. Department of the Interior. This compares with 46,667,000 tons in the preceding month and 44,070,000 in January, 1941. Anthracite tonnage in January last, according to the U. S. Bureau of Mines (preliminary), was 4,532,000, as against 4,118,000 (revised) in the preceding month and 4,977,000 in January, 1941.





Loaders Last Longer and Load More if You Shoot Right

Many mines have trouble shooting coal for maximum loading efficiency, as they change from hand loading to mechanized equipment. Unfortunately, out-of-step blasting methods carry heavy penalties these days.

Oversize lumps that are hard to load, or that wedge between the loader boom and the roof—and tight coal that requires heavy digging—wear out loaders fast, increase costs, and decrease tonnage output.

With equipment almost impossible to get, and repair parts hard to find, it becomes an obligation to blast so that loaders last longer and load more.

Here are four suggestions worth considering when checking your blasting methods:

1. Consider using denser explosives where lump coal is not the primary size wanted.
2. Consider the use of snubbing holes.
3. Consider loading out the snubbers first, thus leaving free space in which the main face can fall.
4. Don't overshoot.

These are just a few of the practical suggestions that an Atlas Representative may have to offer. His experience with explosives may prompt other suggestions. This is part of the cooperation essential to licking today's production problems.

Write for your copy of this new Atlas booklet. Contains practical suggestions for increasing the effectiveness of coal mining methods.

CHEMICALS ATLAS EXPLOSIVES

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"Everything for Blasting"

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The Purple Strand means that the rope is made of 100 per cent improved plow steel—the toughest, strongest steel used in commercial wire rope.

The Form-Set (preformed) construction means that the rope is limber, relaxed, easy to handle. Can be cut or spliced without seizing. Broken wires don't bristle. The rope is unusually well able to stand bending without premature fatigue.

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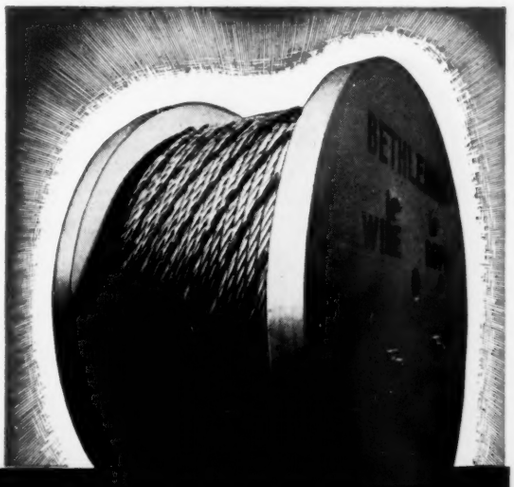

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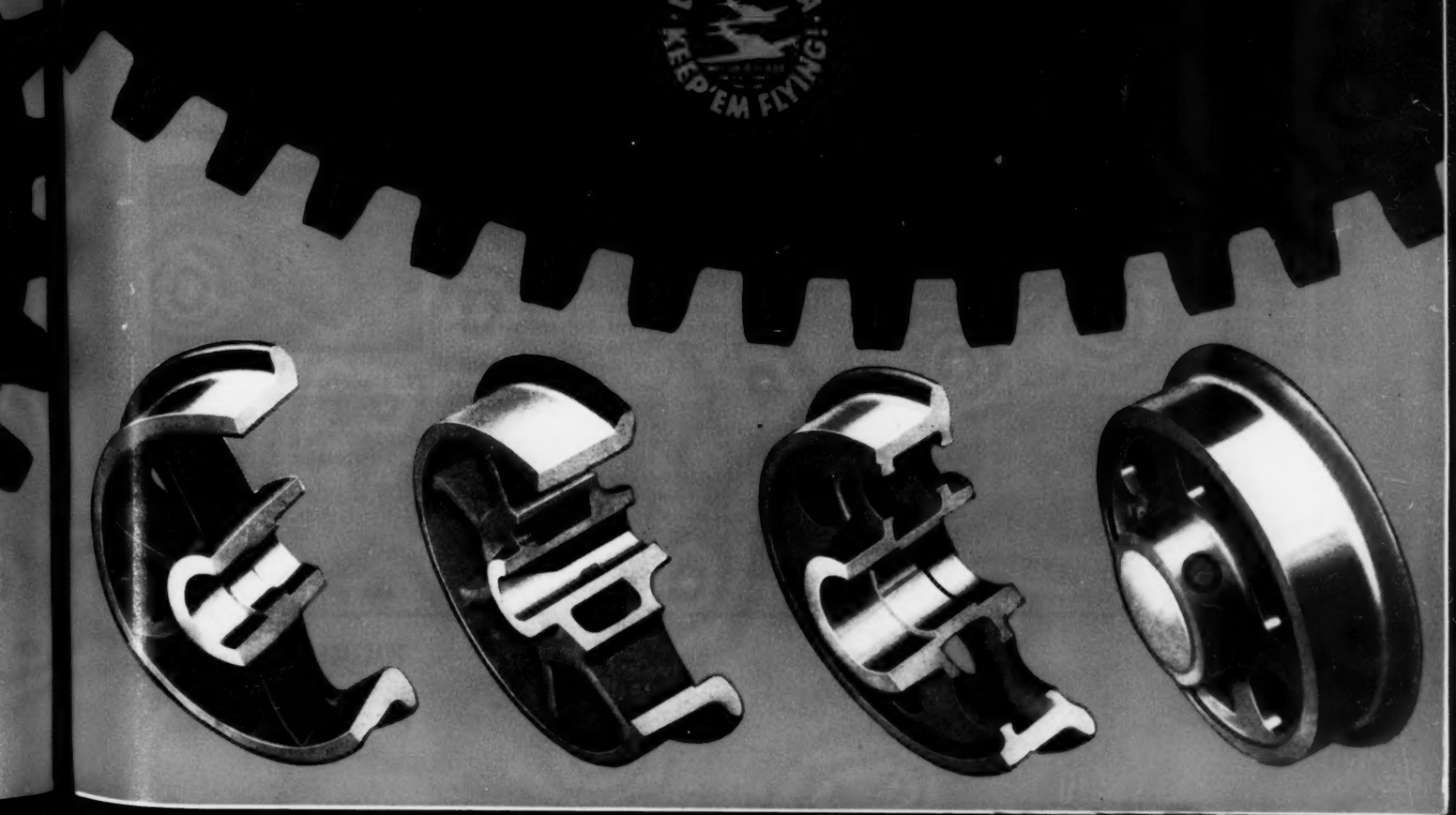


"X-Ray" Booklet Shows New Features of Improved Robins-Gyrex Screen;

Reader Builds Typical GYREX in Unique Catalog

Construction, Design Details Highlighted

Send for Free Copy, Using Coupon Below

PASSAIC, N. J.—Robins Conveying Belt Company, this city, has just released for free distribution a handsome "X-ray" type booklet which describes in an interesting and complete manner recent improvements and general information regarding the well-known ROBINS-GYREX Vibrating Screen. The new catalog (Robins Bulletin No. 115) is replete with unusual effects, all of which are successful in making plain to the reader the scientific design and rugged construction of GYREX Screens.

X-Ray Feature

In the first few pages of the new Bulletin, the various important parts of the GYREX Screen are printed on separate transparent sheets. Together these pages make up a complete screen, but taken separately they permit the reader to study each element of construction or design independently of the rest.

Installation Pictures

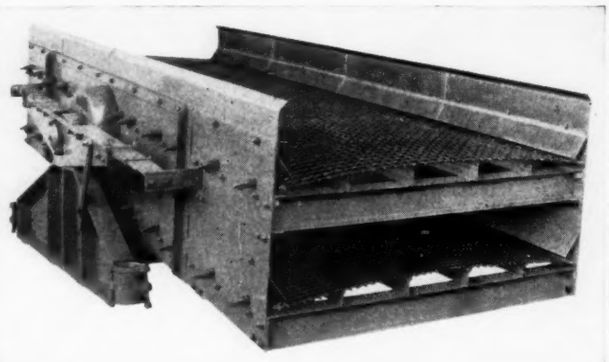
In the center of the new GYREX Bulletin is a colorful three-page spread which testifies to the versatility of GYREX Screens. In all, thirteen actual installations are reproduced, including Sand, Gravel, Coal, Coke, Limestone, Pebble Phosphate, Rip-rap and many other applications.

Complete Layout Dimensions

Complete dimensions with drawings for layout purposes are furnished in Bulletin No. 115, for both Cast Base and Steel Base GYREX Screens. Use the convenient coupon below and request your copy of the "X-Ray" Bulletin today.

DON'T WASTE MATERIALS. If you have not a bona-fide interest in these bulletins—please do not send for them.

Rugged, Vibrating Screen, Built for Hard Service



Robins-Gyrex, product of Robins Conveying Belt Company

Robins-Built Screen Line Is Complete

6 Different Types Cover Entire Screening Range

PASSAIC, N. J.—In addition to the GYREX, Robins Conveying Belt Company manufactures the VIBREX, a high speed, unbalanced vibrator for fine sizing. Bulletin No. 118 describes this popular unit.

The ROBINS-ELIPTEX Screen is ideal for horizontal installations where headroom is limited, or for dewatering service. Bulletin No. 111.

ROBINS-LIQUID Screens for clarifying liquids or dewatering solids are used in dozens of highly diversified applications in the process industries. Bulletin No. 107.

The ROBINS-CONTRACTOR'S Screen is a small, portable, general purpose unit. Bulletin No. 110.

ROBINS FOUNDRY SHAKEOUT Screens are made for both continuous or pick-up operation.

9 Reasons for GYREX Popularity

These Features Fully Described in X-Ray Bulletin

PASSAIC, N. J.—The following are reasons why so many hundreds of operators choose GYREX Screens:

1. Simplicity of design, the result of experienced engineering—means RELIABLE PERFORMANCE.
2. Super-sealed bearings and heavy duty structure—for LOWER MAINTENANCE.
3. Central vibrator location and balanced stabilizing springs, insuring uniform, positive motion—a guarantee of HIGH CAPACITY and EFFICIENCY.
4. Minimum number of easily accessible cloth attachment bolts and ability to flatten live frame to clear chutes—providing SPEEDY CLOTH CHANGE.
5. Positive eccentric shaft and massive anvil-type base frame—which means ABILITY TO STAND UP TO OVERLOADS.
6. Easy access to mechanical parts and guaranteed interchangeability of replacements—make GYREX EASY TO SERVICE.
7. Spring tensioned cloth supported on rubber cushioned arched frame prevents whipping and crystallization — providing LONG CLOTH LIFE.
8. Screw adjusted counterbalance weights—which mean PERFECT BALANCE WITH NO ESCAPING VIBRATION.
9. The wide range of sizes and styles available enables Robins engineers, guided by their broad background of experience, to make the most suitable recommendations—making certain of PROPER APPLICATION.

Please send a copy of your new "X-RAY" Bulletin to—

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Address_____

ROBINS CONVEYING BELT COMPANY
Passaic, N. J.

Gyrex Famous in Many Fields

Versatile Screen Is Positive Stroke Circle-Throw Type

PASSAIC, N. J.—Unsurpassed in versatility of application and in stamina, ROBINS-GYREX Screens are built in a complete range of sizes from 24" x 54" to 72" x 192". The latter are the largest and heaviest vibrating screens in the world. (See picture below). Standard units are available with one, two or three decks; with heavy, cast base and angle adjustment for floor mounting or with steel base for suspended or rigid mounting.

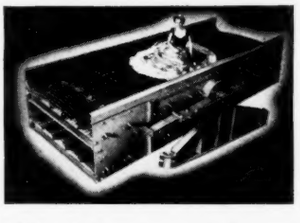
Quick-Change Attachment

This special feature available on GYREX Screens cuts the time required for cloth changes to an absolute minimum. It is a particular boon to operators who must change cloth frequently to produce products of varying specifications.

Robins Screen Cloth

New Robins Bulletin No. 113 is a fact-full illustrated story of the complete selection of Robins Woven Wire Cloth for Vibrating Screens. The bulletin contains helpful data on cloth specifications, wire diameter, comparison of round with square openings, etc. Pictures of various Robins weaves and cloth-holding methods are also shown. Copies of Bulletin No. 113 are available without charge.

World's Largest Screen



This picture was taken at Robins Passaic, N. J. works. The Screen is a ROBINS-GYREX 72" x 192".

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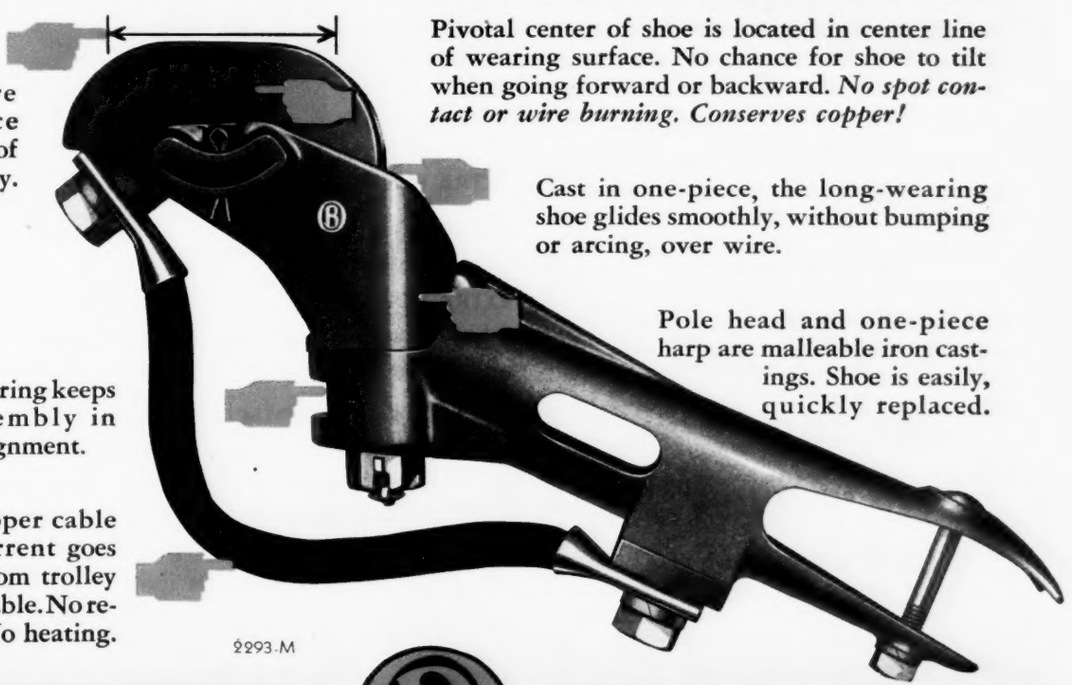
3-inches of wire contact surface provides plenty of current capacity.

Pivotal center of shoe is located in center line of wearing surface. No chance for shoe to tilt when going forward or backward. *No spot contact or wire burning. Conserves copper!*



Cast in one-piece, the long-wearing shoe glides smoothly, without bumping or arcing, over wire.

Pole head and one-piece harp are malleable iron castings. Shoe is easily, quickly replaced.

Internal spring keeps shoe assembly in proper alignment.

Heavy copper cable shunt. Current goes directly from trolley to motor cable. No resistance. No heating.

2293-M

OHIO BRASS

MANSFIELD OHIO · U · S · A

Canadian Ohio Brass Company, Ltd. Niagara Falls, Ont., Canada

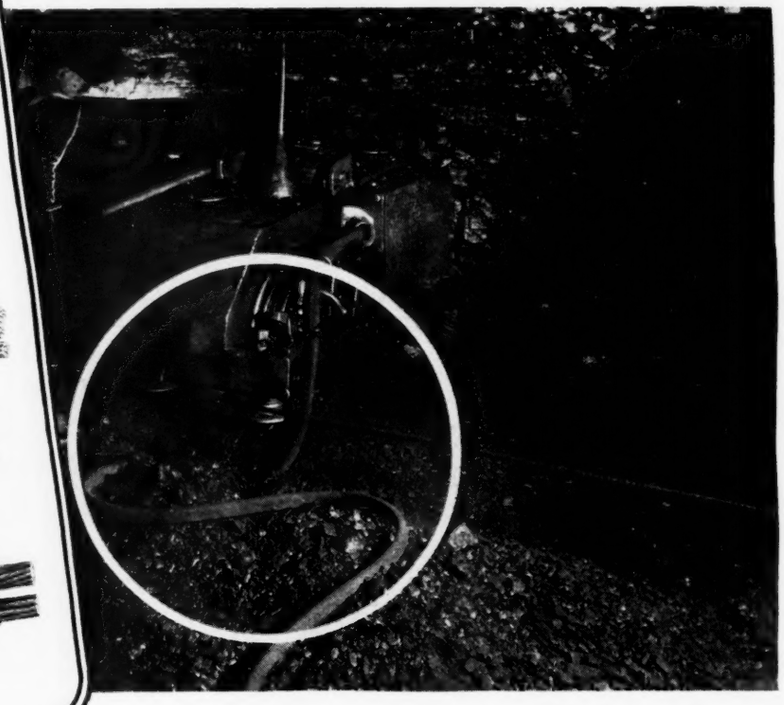
COMPLETE O-B PROTECTION FOR CONTINUOUS PRODUCTION

SAVE TIME...MONEY...VITAL MATERIALS

By Using Longer Lasting . . . More Economical

HAZACORD

PORTABLE CORDS AND CABLES



It's These

EXTRAS

That Bring You Such Important Savings Today

1. **EXTRA FLEXIBILITY . . .** Conductors are of fine, soft, tinned copper wires, rope stranded to add more flexibility and prevent costly, annoying kinks.

2. **EXTRA INSULATION . . .** On each conductor is a high grade rubber compound used because of its resiliency, electrical strength and moisture-resistance.

3. **EXTRA OUTSIDE PROTECTION . . .** The smooth, tough, rubber armor jacket used on Hazacord provides ample protection against bruising blows, sharp rocks or coal edges, in fact, every rough treatment a mining cable must go through. Vulcanized under heavy pressure in a metal mold, Hazacord is built from the inside out to deliver longer, more economical service, no matter how severe the operating conditions are.

There is a Hazacord Portable Cord and Cable for every electrical mining use, tested and proved in actual mining service.

HAZARD INSULATED WIRE WORKS
DIVISION OF THE OKONITE COMPANY
Works: Wilkes-Barre, Pennsylvania
Offices in Principal Cities

HAZARD Electrical Cables for Mining Use

Give "HORSE-and-BUGGY" haulage the gate!

Look what large-capacity, alloy-steel cars with

O-B AUTOMATIC COUPLERS

can accomplish for you!—

Have You Discussed Modern Mine Haulage with Your Car Builder?

Make it a point to do so at the earliest opportunity. His wide background of experience can help you decide what type of dumping arrangement, what capacity of car or what type of construction best suits your needs.

And don't forget your haulage system is either a bottleneck or a boon to your tonnage flow. Investigate modern mine haulage today for tomorrow may be too late. Serve your country and your conscience by stepping up efficiency!

1. *More Tonnage Velocity with less cars*—extra capacity means fewer cars to do the same job!

2. *Greater Haulage Speeds*—heavier, geared-to-the-roadbed cars with rigid steel-beam connections between them can be hauled at higher speeds with less chance of derailment or coal spillage.

3. *Lower Maintenance*—steel construction, roller bearings, rubber draft gear keep cars out of the repair shop—on the job hauling coal for you!

4. *Car Handling Convenience*—O-B Automatic Coupling simplifies and speeds up car handling, saving time at loading, gathering and dumping points.

5. *SAFETY—and don't forget* modern steel mine cars with O-B Automatic Coupling cut down derailments, prevent telescoping in case of wrecks and *completely eliminate* coupling injuries.

2294-AM

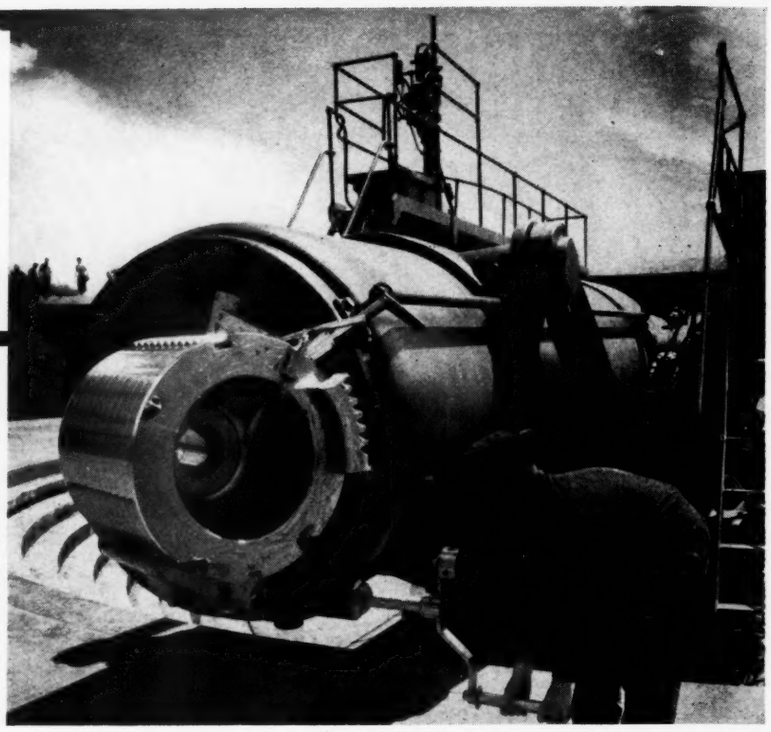
OHIO BRASS

MANSFIELD OHIO · U · S · A

Canadian Ohio Brass Company, Ltd. Niagara Falls, Ont., Canada

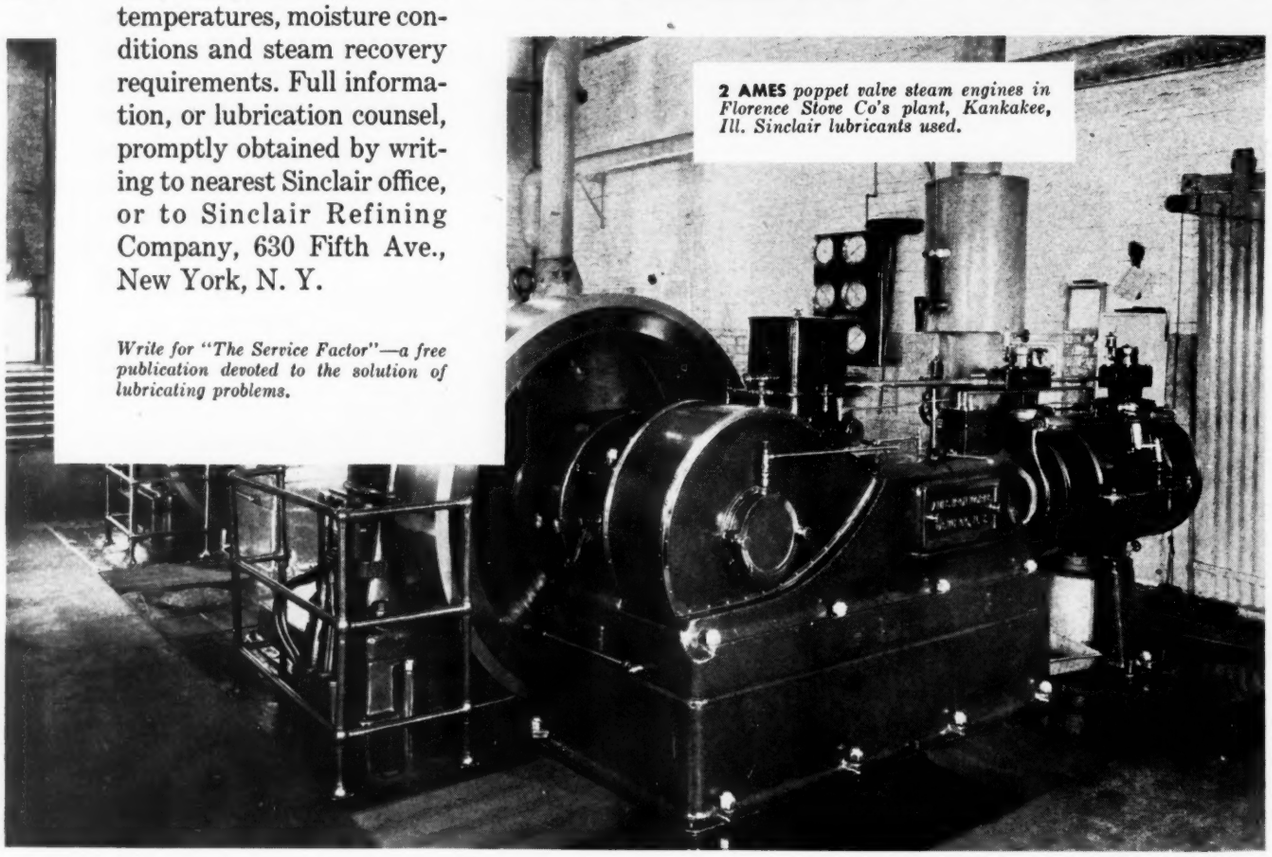
COMPLETE O-B PROTECTION FOR CONTINUOUS PRODUCTION

WAR SPEED-UP cannot be *safely* maintained with inadequate lubrication. For the *safe* lubrication of *STEAM ENGINES* there are . . .



. . . SINCLAIR STEAM CYLINDER and VALVE OILS supported by a long record of perfect performance in heavily loaded installations. No matter how difficult the operating conditions may be, there are Sinclair oils exactly suited to your plant's pressures, temperatures, moisture conditions and steam recovery requirements. Full information, or lubrication counsel, promptly obtained by writing to nearest Sinclair office, or to Sinclair Refining Company, 630 Fifth Ave., New York, N. Y.

Write for "The Service Factor"—a free publication devoted to the solution of lubricating problems.



2 AMES *poppet valve steam engines in Florence Stove Co's plant, Kankakee, Ill. Sinclair lubricants used.*

SINCLAIR INDUSTRIAL OILS

SINCLAIR REFINING COMPANY (Inc.)

2540 West Cermak Road, Chicago • 10 West 51st Street, New York City • Rialto Bldg., Kansas City • 573 West Peachtree Street, Atlanta • Fair Building, Ft. Worth

This tail wags the "dog"

An achievement of Anaconda research aiding both our war effort and our industry.

MINES . . . one of the necessities of our gigantic war effort . . . today rumble with the noise of *work.* To keep this rumbling rhythm steady and incessant, mining machines and transportation systems use large quantities of electrical power.

Here, a bustling locomotive carries its electrical power around with it . . . like a tail. Over sharp-edged rails, thumping over shaggy, splintered ties, reeling and unreeling as the locomotive moves back and forth, the "tail" . . . the copper power cable . . . stands up day after day delivering the ever-so-vital power without interruption.

Sunex Securityflex*, a product of Anaconda research developed to withstand not only the rough and tumble conditions of underground mining but also the sun blistering service of open pits, is the "tail" that's wagging many mining dogs. And the research that built it, the invaluable hours of patient experimenting and testing, now speeds to develop copper wires and cables for an even more potent war effort . . . for a greater industrial front . . . for use in mines, in war-vital plants, in bombers and battleships. 42243

*Trade Mark Reg.

ANACONDA
from mine to consumer

This familiar trade-mark symbolizes the best efforts of modern research and production.

ELECTRICAL WIRES AND CABLES OF COPPER ARE THE LIFE LINES OF OUR NATION

ANACONDA WIRE & CABLE COMPANY

Subsidiary of Anaconda Copper Mining Company

GENERAL OFFICES: 25 Broadway, New York City • CHICAGO OFFICE: 20 North Wacker Drive • Sales Offices in Principal Cities

FOR STRIP MINE HAULING
— You need MORE than "Heavy Duty" Trucks....

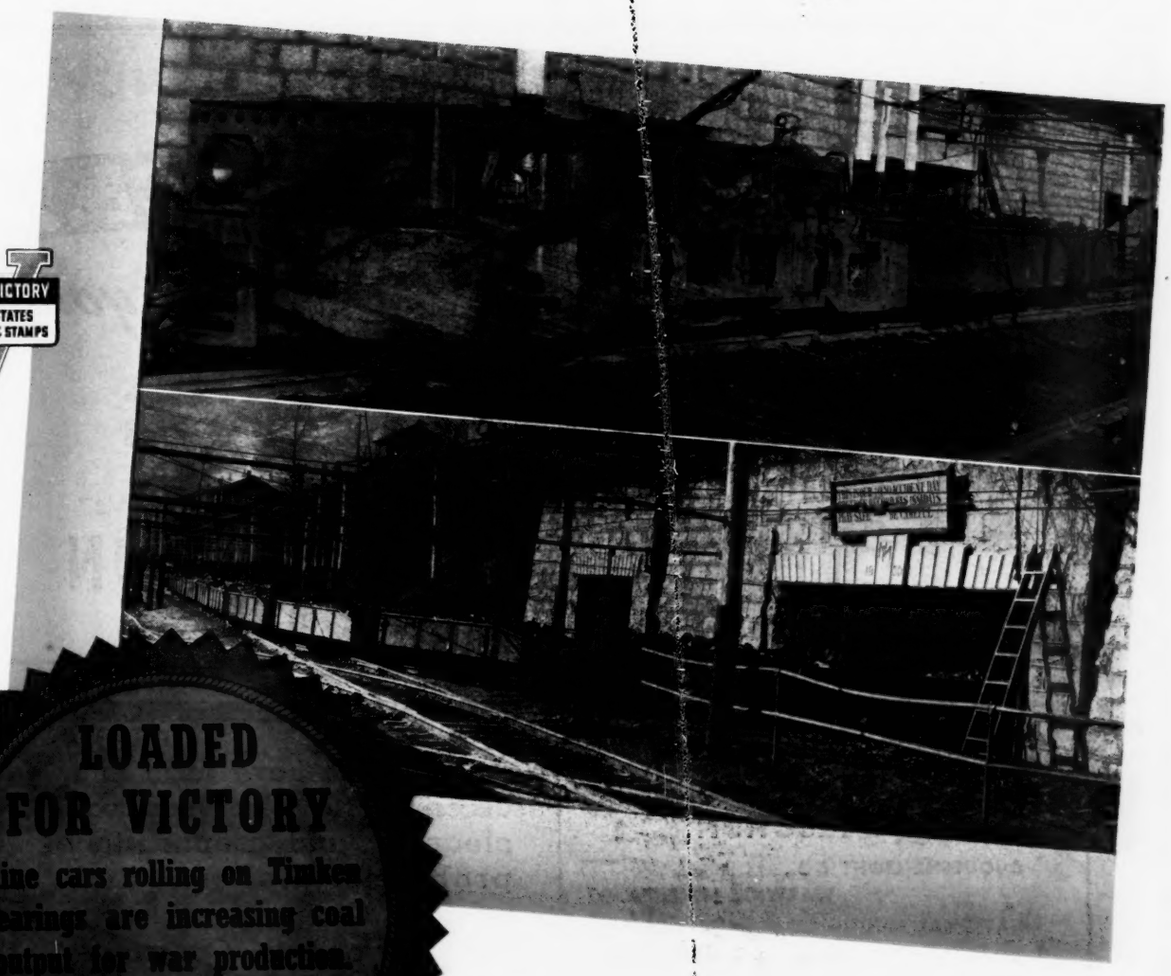
...You need

WALTER TRACTOR TRUCKS
with
4-POINT POSITIVE DRIVE

A truck that is rated "heavy duty" for *highway* hauling, too often fails in strip mine hauling. Your loads are heavier, pulls are tougher, riding surfaces are poorer. Under such conditions, "rated horsepower" means little. What counts most are *delivered power—traction—maneuverability—ruggedness—special engineering* . . . and you get them ALL in WALTER TRACTOR TRUCKS!

Most important, you get Walter 4-Point Positive Drive, which gives you FOUR powerful driving wheels, with 100% traction in each. Patented Lock Differentials proportion the torque to each wheel according to its traction at all times, putting the most power where it is most needed. That's why WALTER TRACTOR TRUCKS can be depended upon to keep your coal moving in any weather, under any road conditions. With spring thaws coming on, this is a mighty essential consideration. Before buying another truck, it will pay you to learn more about this and many other features of WALTER TRACTOR TRUCKS. Write today for detailed literature.

WALTER MOTOR TRUCK CO.
1001-19 IRVING AVENUE, RIDGEWOOD, QUEENS, L. I., N. Y.



TO ASSURE VICTORY
BUY UNITED STATES DEFENSE BONDS & STAMPS

LOADED FOR VICTORY

Mine cars rolling on Timken Bearings are increasing coal output for war production. They will help to assure economic stability after Victory.

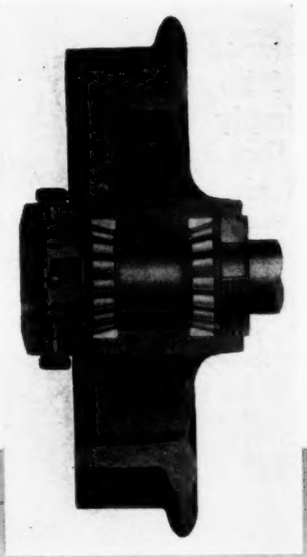
The mine cars and locomotive shown above are in operation at the Nellis, West Va., mine of the American Rolling Mill Company.

There are 160 of these large capacity (5 tons) modern all-steel cars in service and 60 more on order. All are equipped with Timken Tapered Roller Bearings.

The electric locomotive is a 20-ton Westinghouse. It has Timken Bearings in all journal boxes and also on the motor armature shaft.

"If you want to make 'em roll," says this operator, "specify Timken Bearings for all mining equipment." That's a good tip to remember now and in the future.

THE TIMKEN ROLLER BEARING CO., CANTON, OHIO



Standard Timken Bearing mine car wheel application.

Manufacturers of Timken Tapered Roller Bearings for automobiles, motor trucks, railroad cars and locomotives and all kinds of industrial machinery; Timken Alloy Steels and Carbon and Alloy Seamless Tubing; and Timken Rock Bits.

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS

LET FACTS and EXPERIENCE.. Solve your

CLEANING AND PREPARATION PROBLEM

NEW PLANTS NOW UNDER CONSTRUCTION

DUQUESNE LIGHT CO.,
WARWICK MINE, PA.
NATIONAL MINING CO.,
MUSE No. 3 MINE, PA.
ELKHORN COAL CORP.,
WAYLAND MINES, KY.
NEW RIVER CO.,
OSWALD MINE, W. VA.
HUNTER COAL CO.,
ANTRIM MINE, PA.
REPUBLIC STEEL CORP.,
VIRGINIA MINE, ALA.

YOU MUST have facts and experience to solve your coal cleaning and preparation problems. Roberts and Schaefer Company engineers can give you both. Our organization is able to answer your questions and recommend equipment fitted to your requirements. Wet or dry processes and coarse or fine coal washing units are available to suit your conditions.

R&S AND COMPANY

Years of experience with large plants and small will make sure of the results you get whether you are planning simply a revision of your present plant or a plant that is complete and new from the ground up. A plan from R&S will make sure you have what is needed to meet today's conditions. Let's talk it over—no obligation.

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PITTSBURGH, PA.

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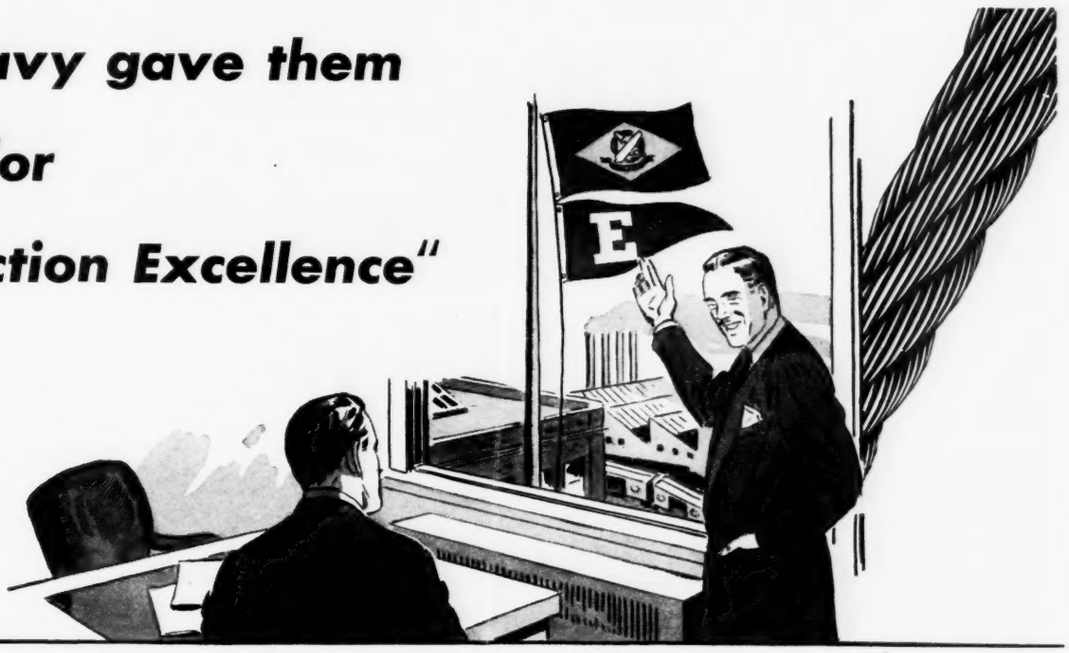
WASHINGTON, D. C.

P. O. Box 570
HUNTINGTON, W. VA.

"The Navy gave them to us for Production Excellence"



They're owned by 7000 people who pulled together, working hard

"Out there on the Roebling staff you see two emblems. The top one, bearing the crossed cannons, is the Naval Ordnance flag. And below that is a pennant, "E" ... the United States Navy's flag of Excellence. The Navy "E" is something to be strived for—at sea, in peacetime, officers and men must work all year to reach the standard of excellence that bestows an "E" on a stack, for engineering; on a turret, for gunnery; on a radio shack, for communications. Ashore, it's given with the Ordnance flag for another kind of excellence — the kind you get from seven thousand heads and fourteen thousand hands that Roebling stands for ... Production Excellence.

When the Navy gave these flags to Roebling, they also pinned an "E" on every man-jack of the Roebling crew. You'll see it proudly worn by the men who are today filling your wire rope needs. They're working with the pride and satisfaction of master-craftsmen, knowing they have pleased one of the world's most demanding customers, just as they'll please you.

The men who man the open hearths are putting something extra into every melt of Roebling "Blue Center" Steel. Something they gained the day they got their "E", when they watched these same hearths swallow a fragment of enemy bomb from the hand of a Naval officer, to be returned with interest to those who menace American liberty.

You'll get that "something extra" if you're in the Navy, using Roebling Wire Rope for any one of its multitude of shipboard purposes, such as the slings that hoist a plane aboard its mother ship.

You'll get it also if you're buying Roebling "Blue Center" for any of the vital industrial uses that must go night and day, non-stop ... for logging camps, for mines or elevators, for plant hoists or oil well drilling lines. You'll get it every time you use the Roebling trade-mark as your buying guide."

JR ROEBLING

Roebling Research, plant facilities; Roebling Quality Control and Engineering ... for years they've been putting extras into "Blue Center" Wire Rope. Extras that you need today, wherever wire rope has a dependable, long-lived job to do.

JOHN A. ROEBLING'S SONS COMPANY
TRENTON, NEW JERSEY
Branches and Warehouses in Principal Cities

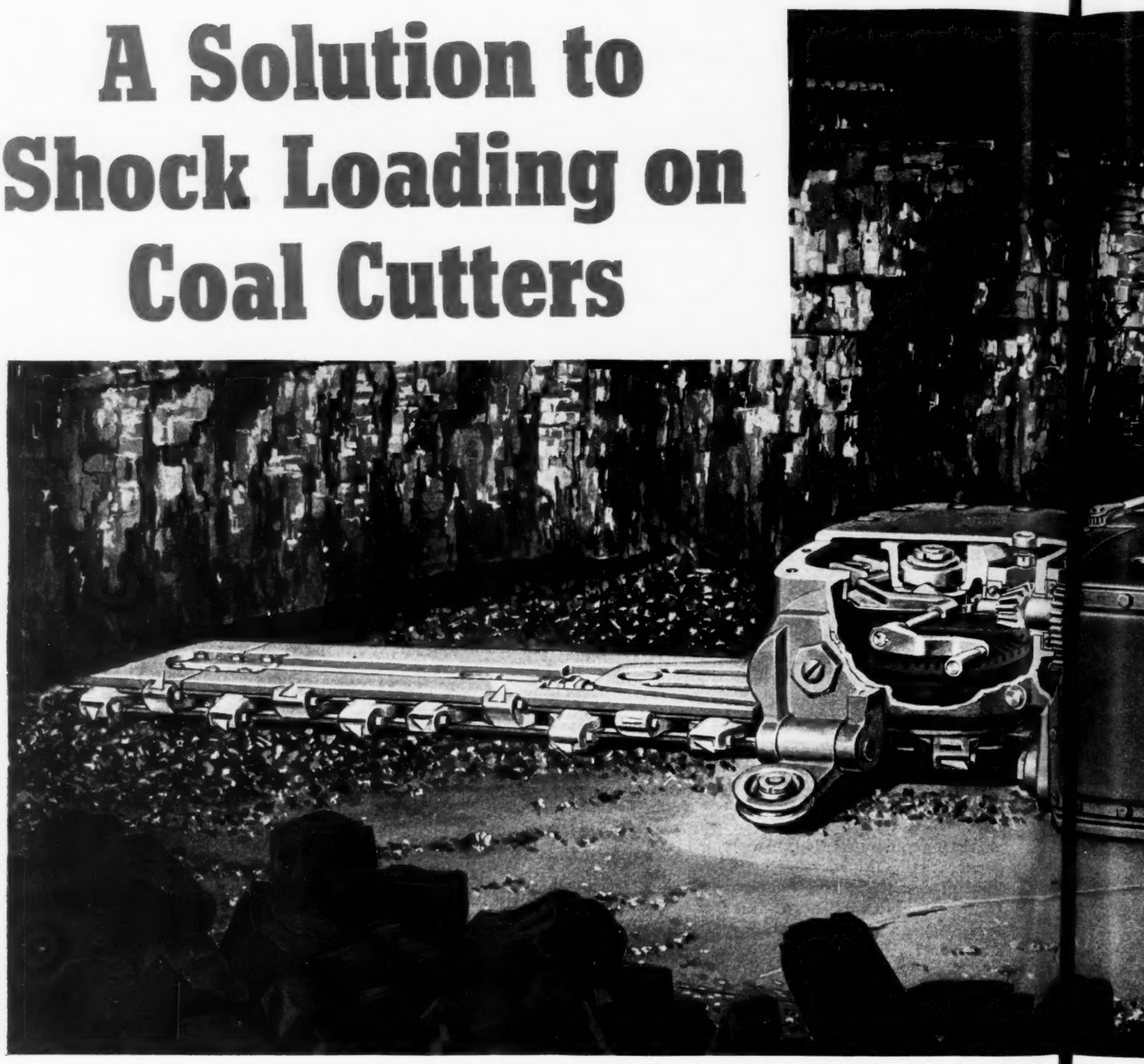
THAT'S THE ONLY WAY TO MAKE

ROEBLING

"Blue Center"

STEEL WIRE ROPE
PREFORMED OR NON-PREFORMED

A Solution to Shock Loading on Coal Cutters



HOW TO MAINTAIN LUBRICATION WHEN FLUID FILMS ARE RUPTURED:

Problem: Bearings and gears in this coal cutter may be subject to heavy pressures and frequent shock loads. They are bath-lubricated...literally flooded with oil. But under the impact of shock loads, fluid films may be ruptured. That means "boundary lubrication" with only a microscopic film left to protect moving metal parts. To maintain lubrication under such conditions requires an oil with great film strength.

Answer: There are *Gargoyle Oils* designed to answer this need. These oils possess exceptional film strength and persistence of film. They stick on the job under jolting shock...retard machine wear... help coal cutters stay at the "face" for long periods with no time-outs for repairs.

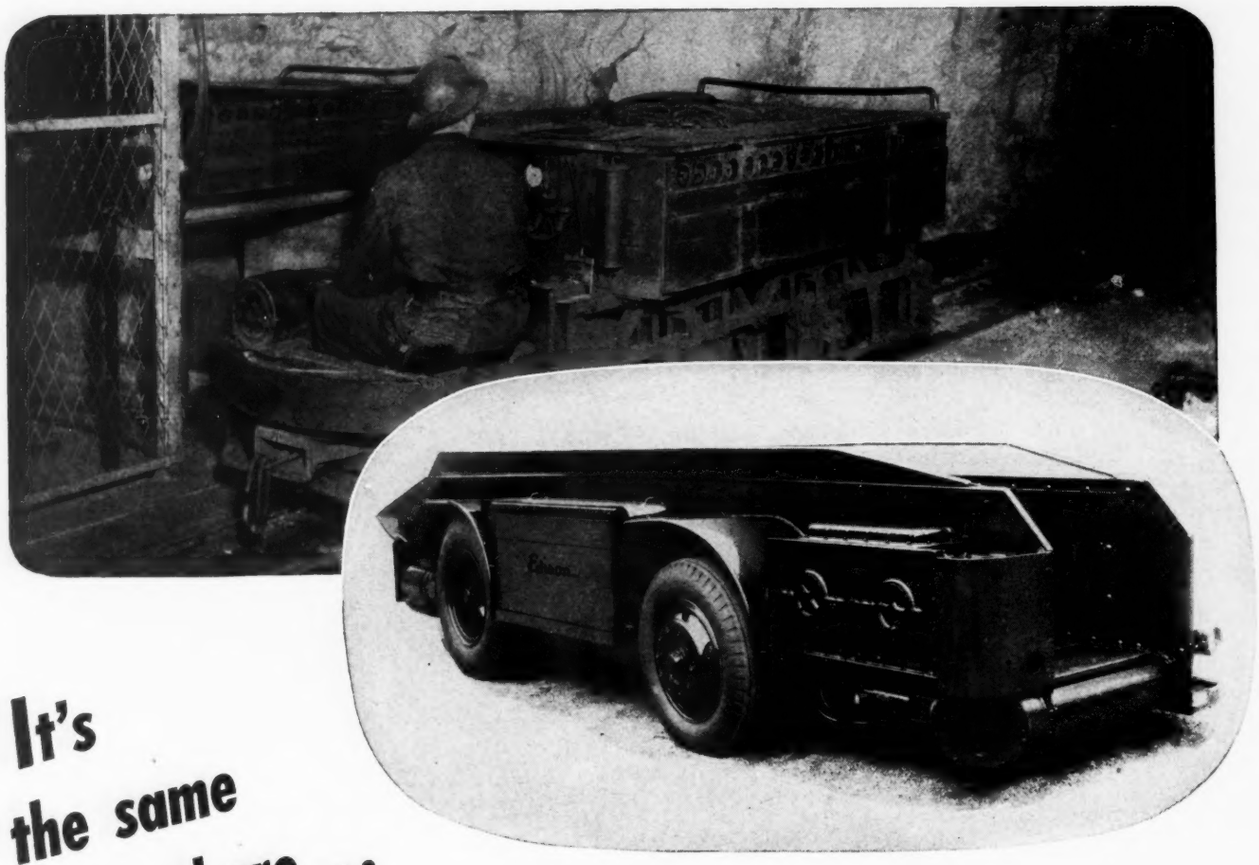
The Socony-Vacuum man who visits your mine can supply you with equally efficient Gargoyle Lubricants for *every* machine you operate.

TO HELP MAINTAIN CAPACITY PRODUCTION, CALL IN

SOCONY-VACUUM for "Correct Lubrication"

GARGOYLE Lubricants

SOCONY-VACUUM OIL CO., INC. — Standard Oil of N. Y. Div. — White Star Div. Lubrite Div. — Chicago Div. — White Eagle Div. — Wadhams Div. — Southeastern Div. (Baltimore) — Magnolia Petroleum Company — General Petroleum Corporation of Calif.



It's the same everywhere...

WHETHER it's ore or coal, the war has everywhere created the same demand—*maximum production* . . . which means uninterrupted production.

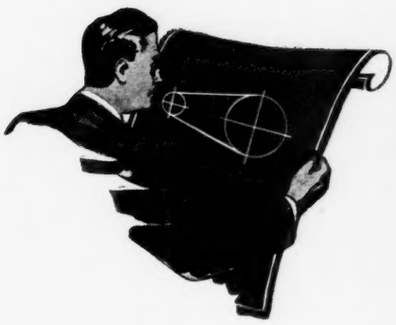
And whether in track-mounted locomotives, or shuttle cars, Edison Alkaline Storage Batteries, with their supreme dependability, are everywhere doing their bit to insure uninterrupted mine haulage.

Their rugged cell construction best withstands the rough usage occasioned by poor track, switching, derailments, and rough mine floors. They thrive on work; can be charged rapidly from any d-c source without the need of expert attention or careful adjustment of rates.

They are not injured by accidents like short circuits or reverse charge. Discharge need not be stopped at any prescribed limit. During suspension of mine operations, they can be laid up indefinitely without risk of deterioration and without need of keeping in a charged condition.

In brief, they are the most dependable known source of power for battery operated mine haulage equipment. Edison Storage Battery Division of Thomas A. Edison, Inc., West Orange, New Jersey, U. S. A.

Edison Alkaline BATTERIES



MILLIONS IN RUBBER WASTE CAN BE SAVED IN INDUSTRY!

LET THE G. T. M. HELP YOU MAKE YOUR MECHANICAL RUBBER EQUIPMENT LAST LONGER

IN American factories millions of dollars worth of industrial rubber goods fail prematurely every year due to improper inspection and unintentional abuse.

This waste must stop—now that America's rubber life line is under attack. Every pound of rubber must work to the limit for victory.

Today it is essential to take the utmost care of any rubber product you now have in operation or in stock—*because replacement may be difficult in the months ahead, even on priorities!*

That is where the G. T. M.—Goodyear Technical Man—can be of greater help and service to you than ever before. In the past his expert skill in the correct application and installation of rubber has been responsible for countless performance records in all branches of industry.

By consulting the G. T. M. today, by following his recommendations on the proper handling of belting, hose and other rubber products, you can increase their service life measurably at a time when any increase in their life is critical.

He will be glad to go over your installations, to make suggestions and give you tips that will enable you to obtain all the service built into your rubber equipment—to prevent waste of America's most precious war material.

This service costs you nothing. The G. T. M. will be glad to call at your plant—to give you the benefit of his specialized training.

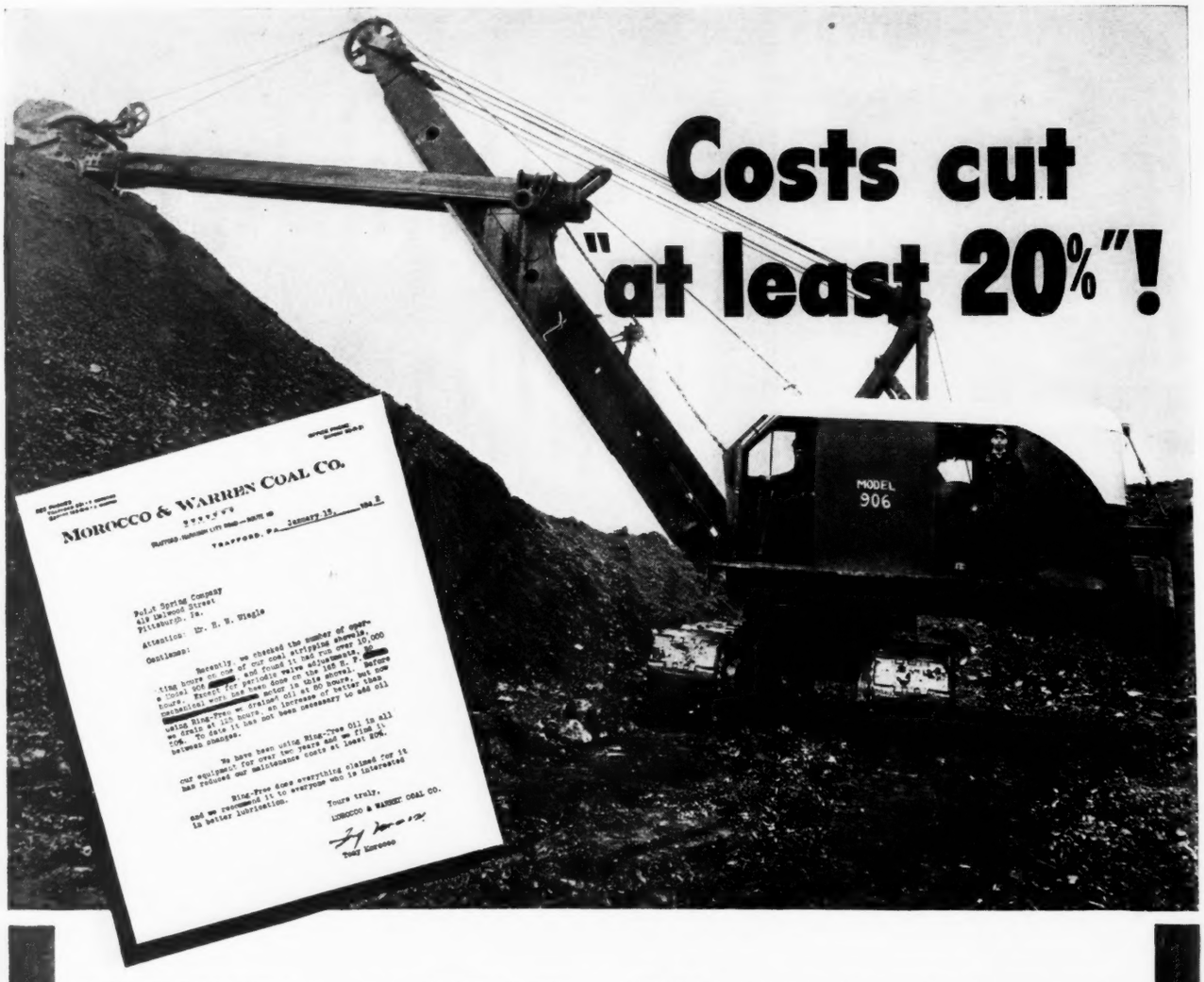
To call in the G. T. M., write Goodyear, Akron, Ohio or Los Angeles, California—or phone the nearest Goodyear Mechanical Rubber Goods Distributor.

G.T.M

Serving on the Industrial Front to guard America's rubber supply

GOODYEAR

MECHANICAL GOODS



Costs cut "at least 20%"!

MOROCCO & WARREN COAL CO.

Trafford, Pa., January 15, 1942

Pulat Spring Company
418 Belmont Street
Pittsburgh, Pa.

Attention: Mr. H. B. Wiegle

Gentlemen:

Recently we checked the number of operating hours on one of our coal stripping shovels, a model 906, and found it had run over 10,000 hours. [redacted] for periodic valve adjustments. Before using Ring-Free we drained oil at 80 hours, but now we drain it at 125 hours, an increase of better than 50%. To date it has not been necessary to add oil between changes.

We have been using Ring-Free oil in all our equipment for over two years and we find it has reduced our maintenance costs at least 20%.

Ring-Free does everything claimed for it and we recommend it to everyone who is interested in better lubrication.

Yours truly,
MOROCCO & WARREN COAL CO.
Tony Morocco

"WE HAVE been using RING-FREE in all our equipment for over two years," writes the Morocco & Warren Coal Company of Trafford, Pennsylvania, "and we find it has reduced our maintenance costs at least 20%."

Recently they checked a Model 906 coal stripping shovel and found it had run over 10,000 hours with only periodic valve adjustments on the 165 H. P. motor.

"Before using RING-FREE we drained oil at 80 hours, but now we drain it at 125 hours, an increase of better than 50%. To date it has not been necessary to add oil between changes."

Then Tony Morocco adds:

"RING-FREE does everything claimed for it and we recommend it to anyone who is interested in better lubrication."

RING-FREE is the *only* oil you need for gasoline engines or Diesels. Think *how* that simplifies your lubricating work!

What RING-FREE has done for others it can do for you. Won't you write us?

• • •

MACMILLAN PETROLEUM CORP.
50 West 50th St., New York • 624 So. Michigan Ave., Chicago • 530 West 6th St., Los Angeles

MACMILLAN
RING-FREE
MOTOR OIL

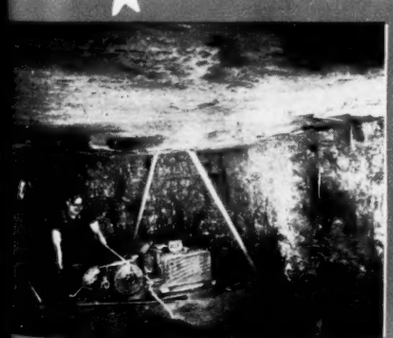
Copyright 1942 by
Macmillan Petroleum Corporation

CARDOX

The Non-Explosive Mining Method

CAN HELP *You*

STEP UP COAL PRODUCTION *Profitably*



...e of longer cutter bar helps increase tonnage.

Loading time reduced because CARDOX rolls coal forward for easier loading.

...ee minutes after dislodging coal with ...RDOX. Visibility reduced only 14%.

All available man-power used to best advantage.

● As you mobilize your facilities for maximum participation in Uncle Sam's all-out war effort, give careful consideration to the *many* and *immediate* ways **CARDOX** helps accelerate economical production.

When the face is broken down with **CARDOX**, longer cutter bars can be used... providing more coal per face for the loading machine, thereby reducing the time lost in moving the units. The slow, heaving action of **CARDOX** rolls the coal forward in a loose pile. This permits faster loading and reduces wear and tear on the loading machine. Men can work more efficiently because there are no noxious fumes with **CARDOX**, and very little dust. Work can be resumed immediately after the face has been dislodged. Other **CARDOX** production-accelerating advantages we'll be glad to demonstrate right in your own mine include... better supervision... better use of men and equipment... better concentration of workings... greater final recovery.

CARDOX CORPORATION · **BELL BUILDING** · **CHICAGO**

Forget These Conditions
Use JEFFREY UNDERGROU

GRADES

For continuous performanc
conditions as bad grades,
low voltage — Jeffrey positi
veyors are the solution. 17 di
chain as well as belt types,
mining conditions. Consult o
Conveyor Engineers . . . the

WET PLACES

LOW VOLTAGE

UND CONVEYORS

THE JEFFREY MANUFACTURING COMPANY

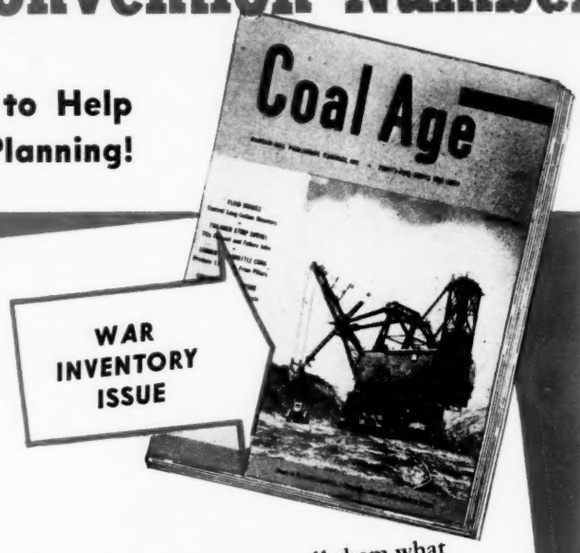
912-99 North Fourth Street, Columbus, Ohio

Sales Offices: Baltimore, Birmingham, Boston, Buffalo, Chicago, Cleveland, Cincinnati, Detroit, Denver, Harlan, Houston, Huntington, Milwaukee, New York, Philadelphia, Pittsburgh, Scranton, St. Louis, Salt Lake City, Terre Haute

Service Stations: Pittsburgh, Harlan, Ky., Birmingham, Terre Haute, Logan-Beckley, W. Va., Salt Lake City, Scranton

★ Watch for COAL AGE's April Pre-Cincinnati Convention Number

. . . A "WAR INVENTORY" Issue to Help Your 1942 and 1943 Production Planning!



● With the approval of War Production Board's Mining Branch . . . the full editorial and advertising force of the April issue of COAL AGE will be focused on a "Three-Way Inventory" objective . . . to aid the industry-wide cooperation so vital to the war effort.

This April "War Production Inventory" issue will be the manufacturers' vehicle of communication to you . . .

1. To tell on what products they are concentrating their productive manufacturing facilities for the duration, and . . .

2. To ask that mining men tell them what they must have in 1942 and 1943 so that the government's overall planning may assure the raw materials required for the job of providing mining men with the machines, equipment and supplies they'll need.

Today's War Production Problems . . .

In a special message to operators and manufacturers, Dr. Wilbur A. Nelson, Administrator of WPB's Mining Branch, will outline to COAL AGE readers the problems faced by the industry today . . . and how we all can work together in specific ways to achieve VICTORY MINING RESULTS.

Sydney A. Hale, chief editor of COAL AGE in a covering editorial will summarize the situation that makes this action so essential . . . how mining equipment and supply manufacturers and operators are cooperating with WPB to make this "War Production Inventory" possible.

Full Pre-Convention Coverage . . .

Here in this April issue you'll find important guidance on how to take fullest possible advantage of attending the annual Convention and Exposition of the American Mining Congress Coal Division (Cincinnati, April 27-May 1) . . . How to coordinate increasing war-time production aims with the most efficient use of men, machines and management . . . Contents to help you to get the most out of the exhibits in planning for 1942-1943 problems.

Manufacturers . . . Have you Full Details of the job Coal Age's April WAR INVENTORY ISSUE can do for you?

Here's a vital job for your advertising—an accomplishment necessary for rapid progress in the mining industry. This April issue will serve as a "Blueprint of Action" for your customers and prospects to cooperate fast on the suggested "Three Way Inventory" objective now so vital to all concerned. If you haven't received our announcement (reproduced at the right) outlining the need for an industry-wide "War Inventory", write for a copy *NOW!*

The industry-wide circulation of this April "War Production Inventory" edition will insure study, planning and action by responsible officials and engineers at the strategic coal producing enterprises throughout the United States and Canada (COAL AGE has over 12,500 paid subscribers). Extra copies will also be distributed throughout Convention Week at Cincinnati! Use the full effectiveness of this issue to display your *"War Production Line"*. Mining men want and need the *specific* information you can give them in this compact form!

Final Forms Close March 15, 1942
Please Reserve Your Space Immediately

YOUR BEST INSURANCE AGAINST

BREAKDOWNS . . . BETTER LUBRICATION!

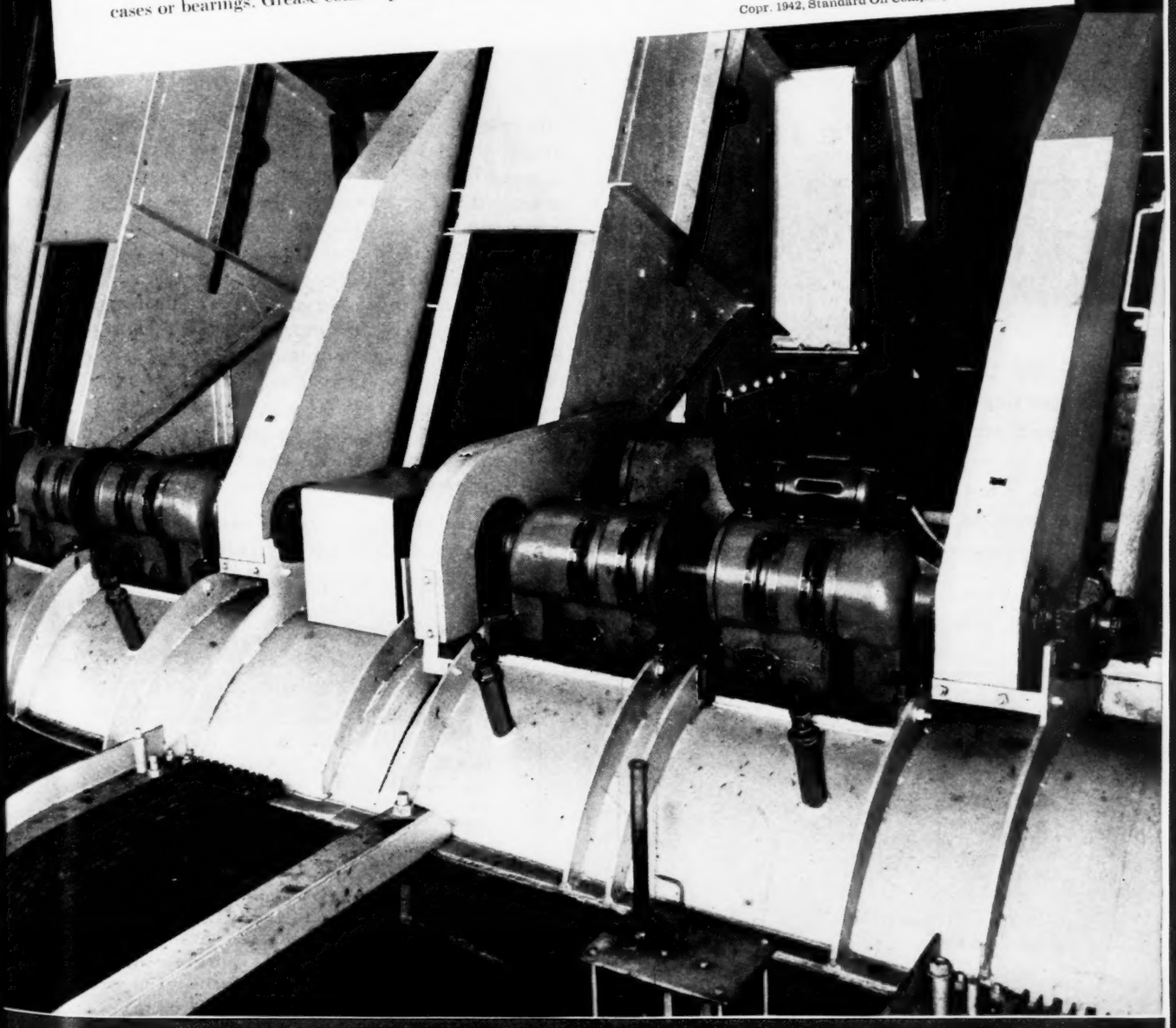
● TONNAGE and more tonnage! Every day the same demand! And you face it with equipment already overloaded and little time for replacements and repairs. More . . . more . . . there's no let-up in sight!

But one thing *is* in sight: this kind of service will bring out any weak spots in your equipment. In many instances, however, you'll get a warning before a failure occurs. Temperatures will rise in gear cases or bearings. Grease consumption will increase or excessive leakage occur.

There's where a Standard Lubrication Engineer can take over some of your worries. He can read the warning signs. He knows just what kind of lubricant will best meet the heavier demands on your equipment. You will avoid many delays from unexpected breakdowns and replacements.

Call the nearest Standard Oil Company (Indiana) office, or write 910 South Michigan Avenue, Chicago, Illinois, for a Standard Lubrication Engineer.

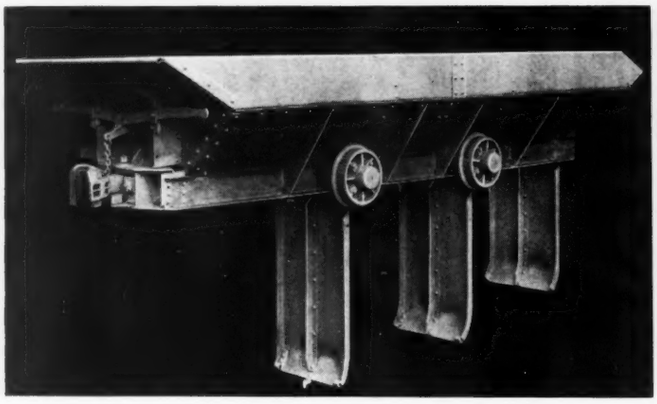
Copr. 1942, Standard Oil Company (Indiana)



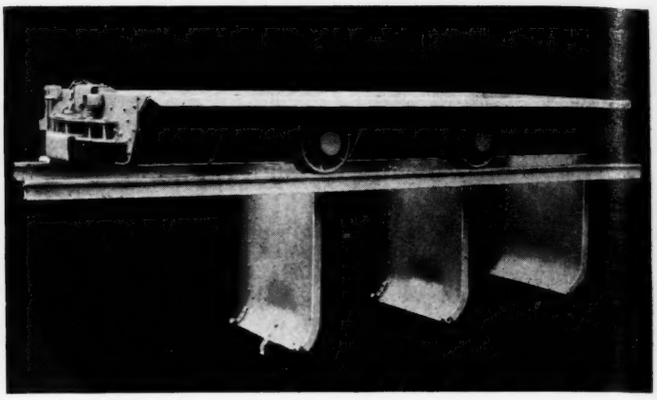
STANDARD OIL COMPANY (INDIANA)

RING...LUBRICATION ENGINEERING...LUBRICATION ENGINEERING...LUBRICATION ENGINEERING...LUBRICA

Don't Ignore the Savings o



This car was built for Pioneer Coal Company, Kettle Island, Kentucky. Width—6 Ft., Height —42 In., Sides—14 Ft., Capacity—203.8 Cu. Ft., Gauge—42 In.

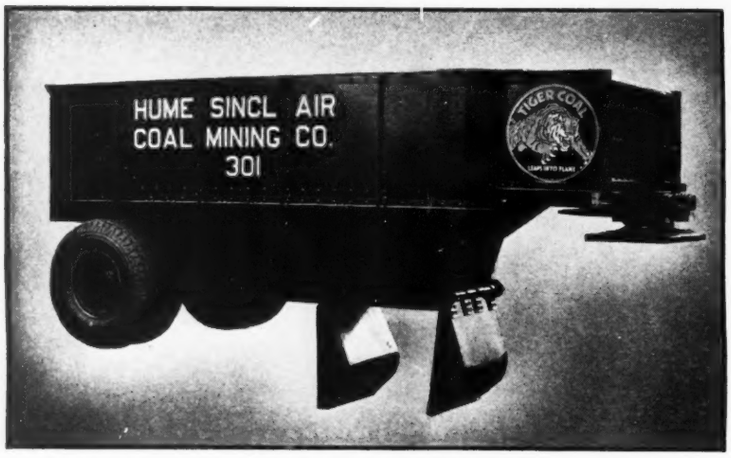


This car was built for Big Jim Coal Company, Blanche, Kentucky. Width—5 Ft. 11 In., Height—18 In., Sides 12 Ft., Capacity—61.7 Cu. Ft., Gauge—48 In.

You can save 10 to 40 cents per ton on the cost of coal by using S-D "Automatics"

We say this because we have the facts supporting this claim. Your savings will depend somewhat, of course, on conditions in your mine, but if your present cars are not *Automatic* Drop-Bottom, you are sure to be losing profits that you could make—profits that dozens of other operators *are* making. You probably think that the savings we claim are too great, but we have the facts to prove otherwise. For example: A mine recently reported to us the following: Tipple Labor reduced 55 per cent; Haulage Efficiency increased 92 per cent; Time saved dumping at tipple 96 per cent; Maintenance Labor cost on cars reduced 90 per cent; and Output increased 28 per cent. What would savings like this mean to your stockholders? Why not increase the size of your dividend checks? It is an easy thing to do, as we can prove, if you will but give us a chance.

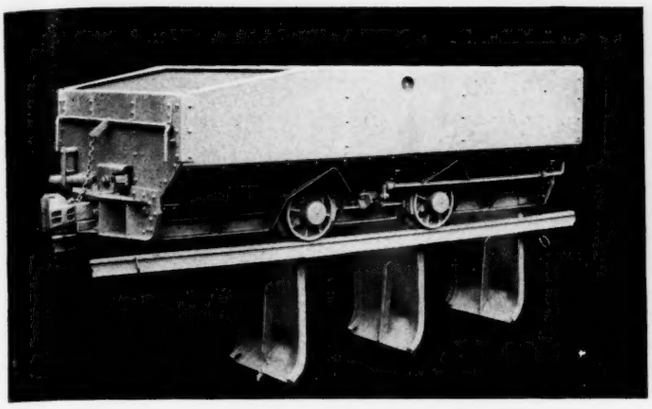
As to production per mine car, one mine having only 40 S-D 1-2-3 "Automatics" in



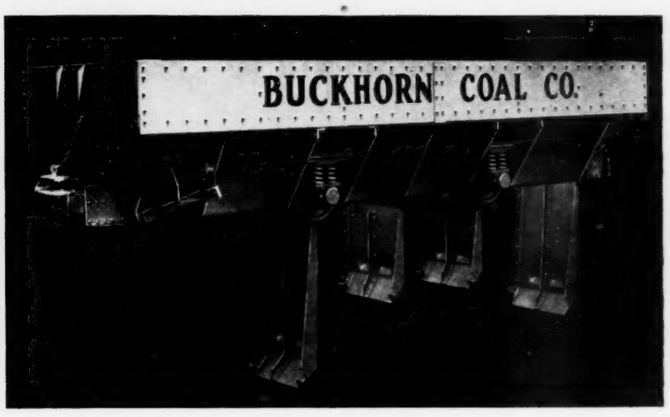
TRAILERS

We build trailers with S-D Automatic Drop-Bottoms in capacities ranging from 6 to 50 tons. S-D Automatic Trailers afford continuous operation—no stops and starts for dumping. Over-all heights are relatively low because the trailers are built close to the ground. The bottom doors swing below the roadway when discharging, down into the bin. In this way the bin is levelled automatically from end to end until completely full—even when the doors are all unlatched at one point. Are you interested? Air brakes are supplied on trailers and we also make air dumping trailers.

# of S-D "Automatics"!



This car was built for Jamison Coal Company, Farmington, West Virginia. Width—6 Ft. 8 In., Height—47 In., Sides—11 Ft. 6 In., Capacity—228.1 Cu. Ft. Gauge—44 In.



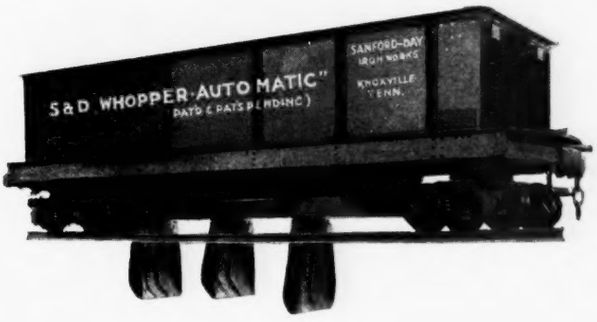
This car was built for the Buckhorn Mine of the Consolidated Coal Company, Herrin, Illinois. Width—7 Ft., Height—52 In., Sides—19 Ft. 4 In., Capacity—386.6 Cu. Ft., Gauge—42 In.

use of 5 to 6 tons capacity each, and with a round trip of 2 miles, is producing 1200 to 1425 tons per 7 hour shift. This means that each average car makes 6 to 7 round trips per 7 hour shift. This means, again, that no time is lost in dumping or in hauling—a saving of time which is possible only with S-D "Automatics". The most skeptical man who reviews the facts must admit that S-D "Automatics" produce values that no other mine car can. On request we will supply names of many companies with similar records.

Each of the four cars illustrated above was built for a special job. They are all alike however, in being S-D 1-2-3 "Automatics". Each is in the service of a wide-awake and well managed mine, and each fills the bill 100 per cent.

RENTAL PLAN

We back our knowledge of what S-D "Automatics" will do by offering you an extraordinarily liberal Rental Plan. Think of it: The average rental cost over a 15 year period will be less than 2 cents per ton of coal handled. Moreover, we supply free repair parts for several years. You can rent a mine-full of money saving S-D "Automatics" without putting up a cent of cash, and you can pay the monthly rentals 5 times over (and more) out of the cash savings made with the cars. All the time you will have an option to purchase the cars and stop the rental contract. But who would?

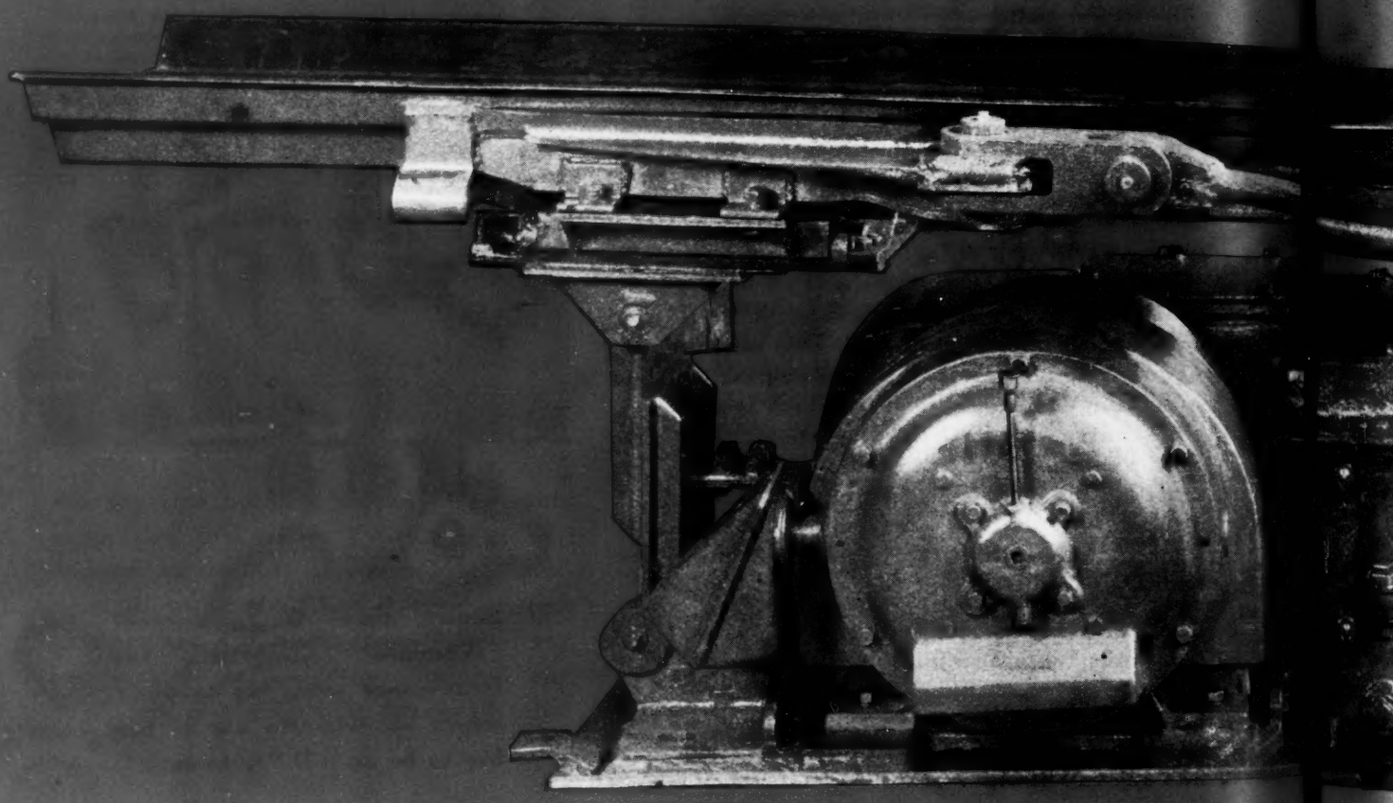


Shown above is an 8-wheel "Whopper Automatic", for strip mines using big capacity steam shovels. No car is too big to be an S-D "Automatic".

S-D "AUTOMATIC" SAVINGS
AVERAGE
26¢
A TON
GET REPORTS OF USERS

Sanford-Day Iron Works, KNOXVILLE, TENNESSEE

Conveyor Mining . . .



Industry and transport, vital factors in National Defense, demand COAL and METALS. Thousands of tons are produced daily with Goodman mining machinery.

GOODMAN MANUFACTURING COMPANY

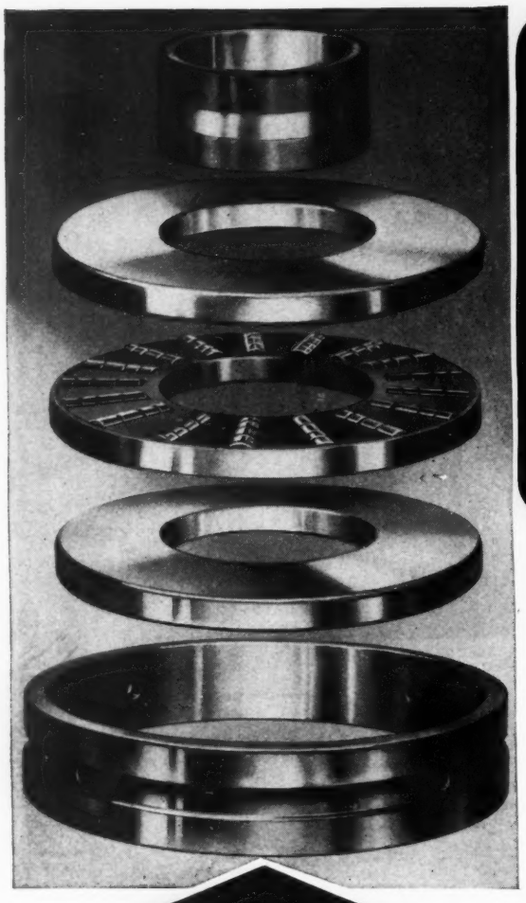
. . . at its best

GOODMAN SHAKER CONVEYORS . .

and duckbills have a universal application and maximum utility. They provide a simplified loading and transporting system that is completely mechanized from face to main haul. Low initial cost, consistent long-life performance and a high yield in tons per man employed ensure maximum production and profits.

Consult a Goodman engineer for details of how this profitable equipment can be coordinated with your mechanization program to produce higher tonnages.

HALSTED STREET AT 48TH • CHICAGO, ILLINOIS



For NON-STOP, 168-HOUR WEEK OPERATION UNDER CAPACITY LOADS—

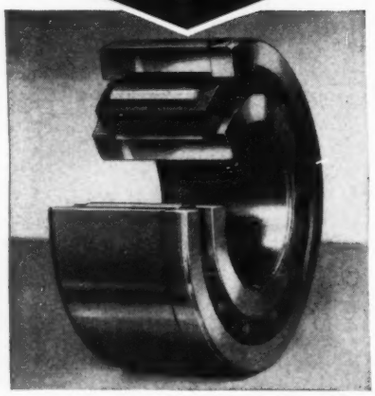
Separate the THRUST and RADIAL loads into these simple RIGHT-ANGLED Components

Particularly when it comes to heavy thrust loads—and to rapidly reversing thrust loads—do you reap the full benefit from the basic simplicity in Rollway Roller Bearing design. For Rollway breaks down all loads into their two fundamental components of pure thrust and pure radial.

And Rollway carries these two fundamental loads on *separate* bearings with solid, cylindrical rollers—rollers of greater mass and cross-section area. That means greater load-carrying capacity and greater resistance to shock and vibration in given dimensions. It means that EVERY load is carried at RIGHT ANGLES to the roller surface. Bearings stand up longer with less service attention; torque loads are reduced; starting torque is lower, even when a constantly maintained oil film is not possible.

ALL THRUST Loads carried at RIGHT ANGLES to Roller Surface

ALL RADIAL Loads carried at RIGHT ANGLES to Roller Surface



Top—*Type SDT Thrust Bearing—double-acting.* Above—*Type MN Double Width Radial Bearing.*

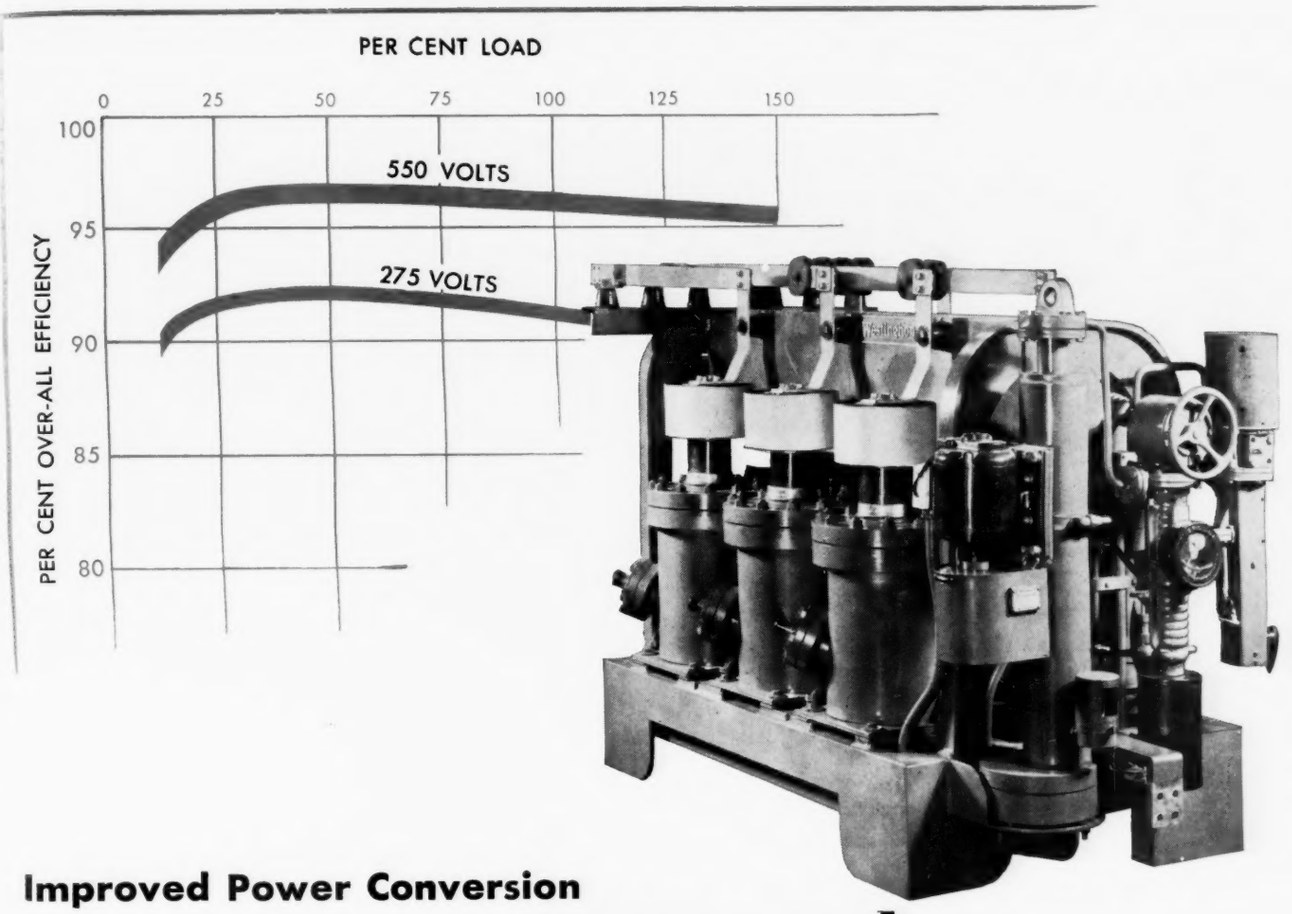
ENGINEERED to the Job

Our studies often show ways to adapt standard bearings.

Rollway's wide range of series and types—engineered for thousands of applications in various industries—usually makes possible the use of standard-size bearings with consequent advantages of quick procurement, easy replacement and low cost. Send us your designs for free engineering analysis and bearing recommendation. You'll find it particularly valuable for your conversions.

ROLLWAY BEARING COMPANY, INC., SYRACUSE, N. Y.

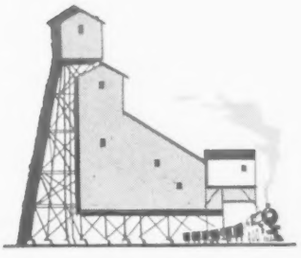
BUILDING HEAVY-DUTY BEARINGS SINCE 1908 **BEARINGS**



Improved Power Conversion

that delivers more coal per kilowatthour

of a-c power input



Fully unattended, automatic operation

No need to tie up operating or maintenance men where IGNITRON RECTIFIERS are in action! Operation can be made completely automatic, permitting units to be operated without attention even in isolated locations.

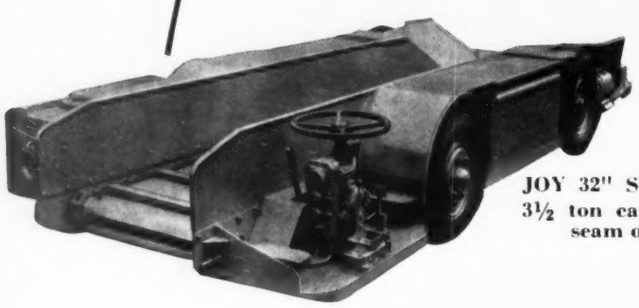
New high conversion efficiency—new high ability to take overloads without harm—means more continuous, uninterrupted d-c power for cutting, loading, and hauling coal. That's why the new, single-anode tank Westinghouse IGNITRON RECTIFIER offers important aid in today's production picture.

Even more important in mining service, short-time overloads, even short circuits, will not harm the IGNITRON RECTIFIER. Circuit breaker settings may be adjusted safely to reduce the interruptions caused by temporary peak load demands. Production consequently can be maintained more steadily.

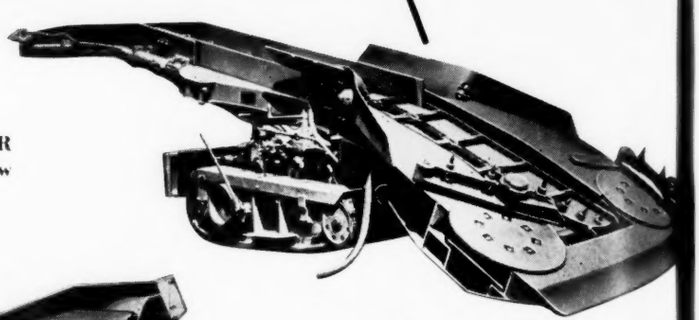
To meet the requirements of mining service, the IGNITRON has been kept lightweight and compact. It is easily made portable. Moved periodically, it can be located near the face of the coal mining operation, thus reducing distribution losses. Write today for complete descriptive booklet B-3024, Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa., Department 7-N. J-10216

Westinghouse Ignitron Rectifiers

IS FARMING MORE MODERNIZED THAN COAL MINING?

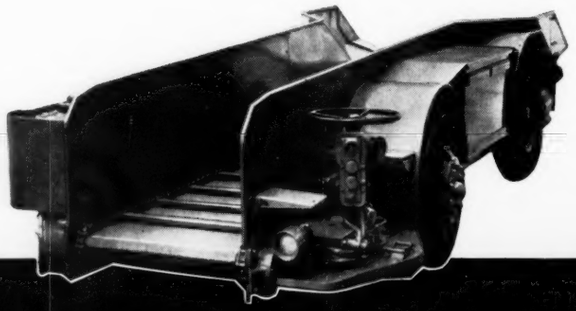


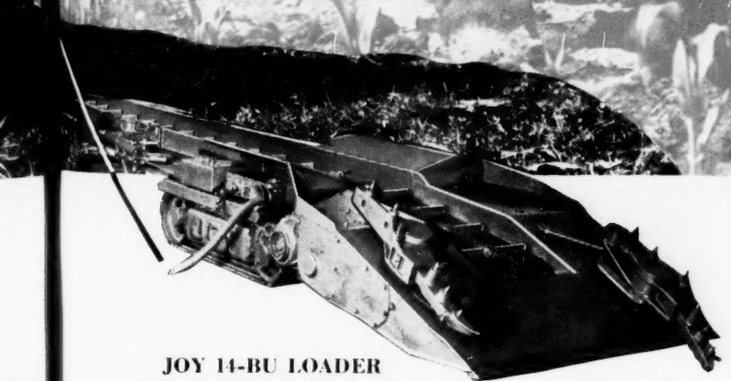
JOY 32" SHUTTLE CAR
3½ ton capacity for low seam operations.



JOY 11-BU LOADER
A heavy duty machine of high capacity, 8-10 tons per minute.

JOY 42" SHUTTLE CAR
6 ton capacity for high seams.

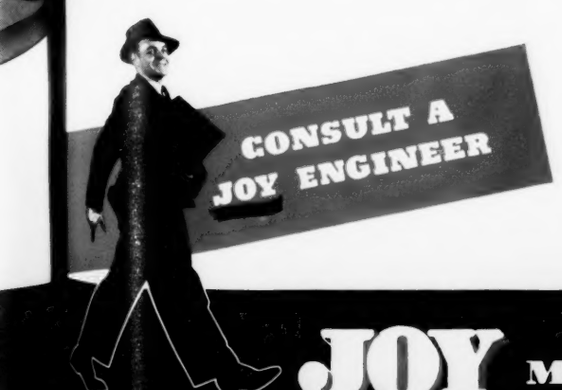




JOY 14-BU LOADER
A high capacity low vein machine . . . only 26" high . . . 5 tons per minute.

Agriculture today is no longer the leisurely industry it once was—America's profitable farms are mechanized to a high degree—the farm hand of yesterday is the farm-mechanic of today—

Coal Mining, too, has found that the true answer to fast, profitable operation lies in mechanization. We will be glad to confer with you.



JOY MANUFACTURING CO., FRANKLIN, PA.

Cut Square with a Cutter

A gap between the end of the safety fuse and the explosive charge of the blasting cap may result in a misfire. Gaps can be caused by cutting the fuse at an angle, or even by ragged edges, due to the use of a dull knife.

Use the fuse cutter. It's specially devised for the job of cutting fuse. It cuts *straight through*—cleanly, squarely, positively—without crushing in the walls of the covering, or sealing the powder core with waterproofing.

With the Ensign-Bickford Fuse Cutter you can also slit the end of the fuse and crimp the cap. Send for the Safety Fuse booklet.

THE ENSIGN-BICKFORD COMPANY • SIMSBURY, CONN.

Manufacturers of Safety Fuse since 1836—also Primacord-Bickford Detonating Fuse

EF-122

ENSIGN-BICKFORD SAFETY FUSE

"Ten Silver Months . . ."

"EVERY WEAPON *we make today is worth ten that we might produce next year; for this year – 1942 – is the critical year in the existence of the United States.*"

This grim challenge was thrown at American industry by Donald Nelson in his first speech as chief of the War Production Board. He was speaking to a group of business paper editors, called together to receive at first hand Mr. Nelson's urgent message to the industries they serve.

"We've wasted the golden months", he declared, "the months in which we could have expanded our steel industry, our chemical industry, our copper industry, and all the others, so that we would have plenty of everything. But we still have ten silver months – the months that remain in 1942–and in them we can do things that we never thought possible."

To that objective Mr. Nelson has dedicated his high talents and boundless energy. And to that task he asks American industry to apply the full measure of its resources and skill.

That challenge should be all that it takes to exact from industry the last ounce of its energies. For by now we all can see that in this war the American way of life is at stake. American industry is the essence of the American way of life. Neither can survive without the other. So, even if it had no better reason, industry must go all out to win this war as a measure of self-preservation. Here self-interest and patriotic duty are synonymous. American industry cannot afford to let America lose this war.

The 1942 job is crucial. If it is well done we have a chance to win. If it is badly done we cannot possibly win. There is the measure of the responsibility that now rests upon the shoulders of industrial management.

It is not just Donald Nelson who asks this of industry. He speaks for the millions of fighting men – on land, at sea, in the air – the world over, whose eyes turn so desperately to the workshops of America. There and there alone can they see the hope of victory.

The people of America are not going to let those men down. They demand of industry every effort and every sacrifice that may be necessary to back them up. On that score, American industry stands, of necessity, on trial before our people. It must come through – or else!

* * *

As industry goes all out to meet this demand, its management asks of those who set its tasks and supervise its performance the utmost possible cooperation. It asks of them specifically an understanding of its problems and a chance to work them out without unnecessary interference. It asks for protection against attack from the rear while it concentrates its energies against the common foe. It asks a truce on economic reforms and social experiments that have nothing to do with winning the war and that are bound to arouse misgiving and mistrust amongst the proprietors of industry. Above all, it asks that it be not made a political scapegoat for every deficiency that is sure to develop in the confusion of a war effort.

This does not mean that industry resents honest criticism or constructive direction. Neither does it mean that it is unwilling to do its best unless it can have its own way in all things. The managers of industry are practical men. They know better than anyone else that unprecedented conditions call for new methods, that they must be open-minded to every criticism sincerely directed toward winning the victory. They know that no one can afford to be smug in the face of a national crisis.

There would be no point to my rehearsing here the pros and cons of such criticisms. Time is too short for that. Only in its performance can industry write a convincing answer to its critics. But as a help toward the achievement of that performance, I should like to clear up, if I can, one prolific source of misunderstanding and mistrust.

I refer to the solicitude of industrial managers as to where their companies may find themselves after the war. *This concern for the future sometimes is misinterpreted to mean that management is blind to the urgency of the present. But it does not mean that. It is a perfectly natural anxiety that must be felt by any responsible management operating under the American enterprise system – which is one of the things we are fighting to preserve.*

Under our system, the managers of industry cannot but feel a sense of responsibility to its owners, not merely for current dividends on their investments but also for the conservation of their properties. That means they must feel some concern over what may happen after the war to a business that now must go all out to help win the war. And their concern is but part of a general concern over what may be the effect of the war on the whole American way of life, preservation of which is our reason for being at war.

To give practical effect to that concern under present conditions is one of the problems of management. It is not an insuperable problem. Competent management will be able to surmount it, I am sure. But the right kind of help from those in authority can make the job a lot easier. And let us note in passing that the problem cannot be written off, as some critics of business seem to think, merely by setting off against it the profits that business can make on war contracts. That misses the whole point.

For a business enterprise is not, as many seem to think, just a "profit-machine." It is not set up and operated by its owners and managers for the sake of this month's or this year's profits, without regard to any other consideration.

The fact is that any worth-while business must operate as a going concern. It consists not only of stockholders and managers, but also of employees, markets, distributors, and dealers. Mostly, I might say, of markets, distributors, and dealers. They are the "reason for being" of any business, the source of its payrolls and its profits.

No competent management wants to scrap such essential elements of its business just for the sake of war-bred profits, however large they might look . . . at the moment. Most of the original reluctance to get into arms production, for which industry has been criticized, was not due to a "greed for profits", as has been charged. Rather did it arise from management's mistrust of "war profits" that can be made only by sacrificing the essential elements of a healthy business.

* * *

But now industry faces a dire national emergency. The survival of our country and all its institutions – including American business–is at stake. So management must shape its course to meet without stint every need of the war

effort. *That means it must subordinate to that effort every other concern. To lose the war is to lose all. We must first win the war if we would save anything.*

To the men of management that presents a grave responsibility. It is fair to ask whether government can do anything to help them meet it. One simple thing I think government can and should do. It cannot dissolve all the concerns of management, but it can help substantially.

Government should do all it can to help management conserve those assets of business that will contribute to post-war reconstruction, when that can be done without prejudice to getting on with the war.

Let me explain. Broadly speaking, every business comprises three elements. One is its tangible assets – its factories, machinery, equipment, and materials. Another is its productive capacity – its management, organization, trained working force. A third is its intangible assets – the goodwill, familiarity, acceptance, and recognition that it enjoys amongst its dealers, customers, and prospective customers.

When the nation goes to war government becomes the one dominant customer of a business. Of these three elements, the first two – plant facilities and organization – become of paramount importance to the job in hand. But so far as the government buyer is concerned, the third drops to minor importance.

But that third element cannot be ignored by the managers responsible for that business. For it will be their mainstay when they must rebuild that business after the war, when government has lost all interest in its existence, except as a source of tax revenue. That is why government can help greatly if now, during the war, it recognizes the legitimate concern of management to conserve those assets that will be essential to survival after the war.

Everyone recognizes the obligation of government to demand that the individual business go all out for war production, to forbid the production of goods not essential to wage war and to commandeer those that are, to require that a business sacrifice its markets and disrupt its distribution organization. No one questions the right of government to restrict arbitrarily the amount of earnings that a business may retain as profit from its war activities. In short, no one questions the right of government to become the dominant partner in any business that may be needed to win the war and, as dominant partner, to put the national need above any conflicting interest of the business.

But, as it does all this, government should remember that the survival of that business is staked on the public's knowledge and use of those discontinued or commandeered products, on the stability of that crippled dealer organization, on the ability of the business to maintain its standing in a market-place from which, temporarily, it may be barred.

And government can help management to deal with the exacting task it now faces, if it will do all it can to avert the needless sacrifice of business interests that do not conflict with war needs, if it will but remember that one of these days, that business again will be on its own, gathering up whatever resources it may have left, recreating its markets, rebuilding its distribution channels, reestablishing itself as a going concern . . . and doing all this in a competitive world without benefit of war orders.

The only foundation upon which any business can hope to rebuild when that day comes is its customers' memory of its name and their understanding of its products. Whatever credit may be coming to it for its war effort will not avail it very much if it permits itself to be forgotten. Its chief assets in that day will be the identity, recognition, and acceptance it still enjoys amongst those to whom it must look for business.

That is why so many business men, already going all out on their war jobs, become apprehensive whenever some word or act of a legislator or government official seems to question the validity of their sales, promotion, and advertising activities during the war. For they know that it is by such measures alone that any management can hope to conserve – while its business goes to war – the values it will need when it returns to civilian service.

That is why I ask government to do all it can to allay such uncertainties, to reassure business of its desire to help conserve those intangible assets that mean so much to business security. For that, I believe, will strengthen the hand of management in a big way as it goes all out on the vital job Donald Nelson has staked out for industry.

* * *

He has told us that if we are to make these ten silver months productive enough to make up for the golden months that are gone, industry must do things it never thought it could do. That is dead right. For America now finds itself in a position it never thought it could be in.

All too slowly, but very surely, it is dawning upon us that this is OUR WAR. Moreover it was our war long before we knew it or did much about it. So our job today is not merely to match the current production of our enemies. That is not enough. We must produce also enough to match the surplus of resources they had built up before we got started. We must produce enough not only for our own needs, but also for all the United Nations.

Moreover we must produce all that we need for *decisive* victory, for anything short of that will mean defeat. If we would save the American way of life, we must destroy once and for all the forces that threaten it. A stalemate would mean but an armed truce and what that might do to the American way of life and to American industry no one dares to guess. Victory must mean *decisive* victory. And this, very definitely is our war.

And just as definitely, this is OUR YEAR. For in this year – 1942 – we must prevent our enemies from achieving an advantage that might put victory forever beyond our reach – despite all our vast resources. It is an appalling fact that victory may slip beyond our grasp – not in 1943 or in 1944 – but during the months just ahead of us.

"Industry's responsibility in all of this is great," says Donald Nelson. "The job will take brains and initiative, but we can do it if we go out with a will."

To Mr. Nelson, that initiative means that industry must lead rather than follow in the march to more intensive use of our machines and our man-power. We dare not wait for new facilities to meet our mounting needs. More and more we must press for more widespread subcontracting and conversion. And he is counting on that initiative, backed by ever more aggressive effort, to avert or to minimize the compulsory measures that now seem imminent.

"We must stop thinking about what we're going to do to the enemy in 1943 and start thinking of what we're going to do to him in March of 1942.We must make today the things we would be making next year . . . if we had the time to spare."

That, says Donald Nelson, is the task of American industry during the next "Ten Silver Months." And to that gigantic task American industry now must bend every ounce of its abundant strength.

James H. McGraw, Jr.

President, McGraw-Hill Publishing Company, Inc.

This message is appearing in all McGraw-Hill industrial and business publications, reaching over a million readers.

DEVOTED TO THE OPERATING, TECHNICAL AND BUSINESS PROBLEMS OF THE COAL-MINING INDUSTRY

Coal Age

Established 1911 — McGraw-Hill Publishing Co., Inc.
SYDNEY A. HALE, Editor • MARCH, 1942

Pertinent and Impertinent

• AND IT IS essential to keep in mind Pearl Harbor. Money is needed to finance our victory campaign. Buy Defense Savings Bonds and Stamps now.

• INCREASED storage of coal, all agree, is a highly desirable goal. But sound, valid reasons may be expected to further this objective with less chance of adverse repercussions than purely emotional appeals.

• HOW ABOUT idle equipment? If it can be used, steps should be taken to ready it for service if it is not already in such condition. But if it is unusable, the government says scrap it so it can be used to make new and vitally needed steel and add to the available supplies of other metals.

• "A MILLION tons per fatality" would be a good slogan for 1942. Production per fatality in recent years has been about 350,000 tons, so a jump to a million appears to be a jump indeed. But the records of several companies show that it is entirely possible. Now, more than ever, is the time to crack down on injuries and fatalities. Men trained in first-aid and mine-rescue become anxious to relieve suffering and save lives. Similarly, men who have studied safety are keen to avoid injury. Recognizing safety as a skill that can be acquired will do more to make a safe man than an acre of inspirational sermons.

• YES, THAT IS the milkman breathing down the back of your neck. He is, believe it or not, a member of the United Mine Workers—at least in some sections of the country—along with cosmetic employees and other workers once thought somewhat far removed from mining. How come? District 50 takes in gas, coke and byproduct workers. Since certain plastics used in button manufacture are derived from coking, button workers have an apportunity to sign up. Casein, a milk product, also is used in making buttons, so farmers with cows are invited to get on the wagon, and some have done so.

• WHAT are some of the things a coal man might be giving thought to about now? How about the specimens below, along with even greater stress on efficient production, preparation, maintenance and safety?

1. More encouragement of coal storage while coal and transportation still are relatively plentiful.
2. A survey of needs for materials and supplies for the coming year for his own information and transmission to manufacturers and the War Production Board.
3. More pressure on economical use of material and on finding and using substitutes for rubber and steel and other metals.
4. Mining of scrap piles and salvage of usable materials. Metal scrap, particularly, should be raked up and shipped out to help alleviate shortages.
5. Setting up a system of hiring and training new men to replace those taken by the draft or lost for other reasons.

In the Right Direction

NUMEROUS professional organizations have served and are serving coal mining and coal-mining men, although relatively few address much of their efforts to electrical and mechanical work and still fewer to maintenance. Electrical and mechanical organizations, however, are growing in number and giving increasingly valuable service, but maintenance still is largely neglected from the organizational standpoint.

So doubly welcome is the news that coal men in the Monongahela Valley region of western Pennsylvania and northern West Virginia have decided to do something about it. With the growing stress on keeping equipment operating at peak capacity, their establishment of an organization designed to throw more light on maintenance questions is a step that warrants widespread emulation.

Smiles

NOTHING succeeds like success! Allocation in the anthracite region prospers largely because business has been so brisk that the tonnage allocated has been enough to please everybody at the reasonable prices

obtainable. And because business is brisk, the bootleggers are going back to work for the coal companies or making agreements with them to lease the bootleg holes and deliver the coal at the breaker, which again pleases the company and increases its allotment.

Moreover, the draft and the demand of defense industries reduce both the army of bootleggers and the number of miners in legitimate employment. So the bootleggers can get back into a legitimate occupation. Thus there are smiles everywhere. Though there are no big war contracts in the region, business in Anthracitia is looking up. One wish still remains unfulfilled: the call to help in meeting the coke scarcity at blast furnaces and cupolas has not yet been heard, but many are confident it will be before the war is over.

Can You Help?

SUPPLYING the arms that this country needs for victory requires the use of every possible machine tool in working condition. It therefore has been suggested that operators of shops throughout the nation check their equipment and see if their schedule will permit some participation in the manufacture of military equipment. Lathe equipment, for example, may be used to turn pins on a subcontract. If any operator of a coal-mine shop thinks he has capacity and labor to spare for war work, he will find the War Production Board glad to suggest ways in which he can do his bit.

Brains Versus Suffering

WHEN machines or methods new to the workmen and officials of a mine are introduced, too frequently a man is injured before officials have become cognizant of a danger which is easy to guard against or to avoid. The answer is simple. Management should recognize the chance of hidden dangers with new equipment and delegate a competent official to study the proposed change from the standpoint of detecting the dangers by exercise of gray matter rather than by human injuries.

A visit and thorough study at one of several mines of long experience with the equipment or method should reveal the inherent dangers. Usually a relatively inexpensive guard, an automatic device or a safety rule incorporated in the job training avoids the potential hazard. Where a manufacturer's demonstrator is on the job, he, too, usually warns of these dangers.

Fuel Technology

FOR SOME YEARS men have wandered one by one into fuel technology. They alone know how they got there. No signboards showed the way, for the colleges until just recently furnished no curriculums. By leaving well-worn roads leading to careers in mining, mechanical or chemical engineering and climbing the fences, they at last arrived at fuel technology, being acclaimed, however, as something else than graduates of that study. They had to explain their presence in this strange company of individuals who had strayed in from recognized professions and who had concentrated their talents on a profession that no one recognized and which seemed to have neither beginning nor end.

This is a matter to be corrected. A few curriculums for fuel technologists should be created. Pennsylvania State College has one, and there should be more. Research without teaching will do little for progress; with teaching we may hope that the brilliant advances in petroleum technology will be duplicated. Plenty of material for such a course is provided already and more will follow until those who map the curriculums will find there is an embarrassment of riches. As it is now, the information available is given to men as an aside in courses having a wholly different purpose. With graduates of fuel technology entering the professional field, pure scientists may be shocked at so much compartmenting of the fund of human knowledge, but no individual can "know it all."

True, the public may believe coal to be only a black substance dug out of the ground and nothing more, and that fuel technology is an entirely unjustified innovation, but the public in this needs instruction. It believes everything simple but what it has itself already essayed. The more the so-called "professional engineering" examiners scoff at fuel technology as a science and try not to recognize it, the more need that courses be established to convince them of its importance, and the more surely must the road to it be provided with a hard surface, shoulders and markers. For fuel technology is the lifeblood of the correct use of fuels. Why should mining, mechanical and chemical engineers with a smattering of fuel technology be recognized as experts in the combustion of fuels, and men who make it their life work be regarded as interlopers, despite an equally intensive training in the subject of their choice?

Coal to the Rescue?

RESTRICTION of the use of natural gas and oil for fuel and heating purposes already is under way in some sections of the country and may be expected to give way eventually to full rationing everywhere to conserve these fuels as much as possible for essential war production and activities. The situation offers both an opportunity and an obligation to the coal industry, which long has maintained that it is in a more favorable position to take care of not only normal demands for its product but also of demands resulting from curtailments in supplies of other fuels.

But the development of the condition alluded to above should give coal producers pause for thought. Just how well is the industry prepared to fill any extra demands which may be placed upon it? If it should find itself lacking, what steps may be taken to improve its position? Now clearly is the time to prepare to get out a larger tonnage and, even more important, to prepare plans for assisting to the utmost in the speedy, efficient movement of coal to the consumer and in equitable rationing if that should come to pass. Plans made now may save much grief later.

WASHINGTON ROUNDUP

Highlights From the Nation's Nerve Center

Men, Machines, Money

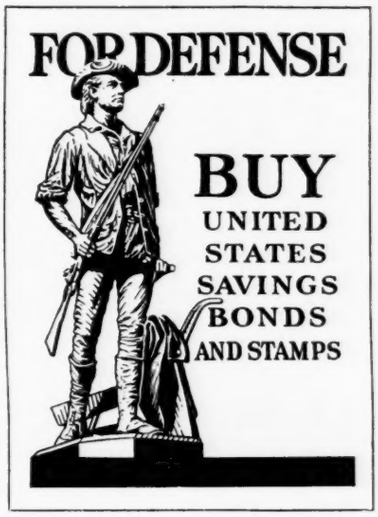
AN ARMY of 3,600,000 men is the goal in 1942. If reached—and indications are that it will be—this total will necessitate the induction of 2,000,000 additional men this year. To replace them in industry, the government is pressing its program for securing and training new workers—both women and men unfit for military service or deferred for various reasons.

To equip this Army, the President's victory blueprint calls for, among other things, 60,000 airplanes, 45,000 tanks and 20,000 anti-aircraft guns in 1942 as a start on a greatly expanded program for 1943, involving, for example, doubling the airplane output. To move these men and their equipment where necessary and also handle vital materials, the blueprint also calls for 8,000,000 tons of shipping in 1942. Indications are that the bill will be filled.

Over $141,000,000,000 is the score to date in financing the cost of ultimate victory. Approval of the $21,000,000,000 Navy Appropriation Act on Feb. 7 brought the total of all Congressional cash appropriations and contract authorizations for war purposes to $105,000,000,000. In addition, there were RFC commitments for war objectives of $5,130,000,000. On Feb. 17, the House approved, 371 to 0, an Army, Navy and lend-lease appropriation of $32,070,901,900, of which the Army's share is $22,888,901,900.

Industry's New Role

CONVERSION, meaning changing plants now manufacturing peacetime goods to the production of munitions, is the "only straight, fast road to victory" in the opinion of Donald M. Nelson and the War Production Board. Industries already being converted include the automobile, typewriter and refrigerator. Ultimately, it may be expected that basic requirements of peace-time goods will be limited to a minimum number of plants, with the rest turned to war output.



"Every weapon we make today is worth ten we might produce next year," Mr. Nelson told the conversion meeting of the National Conference of Business Paper Editors on Feb. 13. More output must be obtained from present war plants and, since time and materials are not available for building new, conversion is a necessity. Furthermore, the services of small producers must be enlisted to the limit.

Mining, by its very nature, will be less affected by this program than other industries, but it still has the job of filling the bill for coal as efficiently as possible; maintaining its working force by recruiting and training new employees; and helping the WPB and the nation in a vital problem by the wiser use and conservation of materials.

Manpower

THE INCREASE in war production, it is forecast, will require over 10,000,000 more workers in 1942, in addition to Army inductions. These workers and Army men, it is expected, will come from the following sources: men now employed in non-essential industries, some 7,900,000; self-employed, 400,000; agricultural, 400,000; unemployed, 1,500,000; new workers, 2,000,000. About 37 percent must be skilled, 38 percent semi-skilled, and 25 percent unskilled.

No material changes have been made in selective-service standards, although, among others, certain motion-picture employees and union leaders in "key" positions now are classed as "essential" and consideration is being given to preventing a drain on farm help resulting from inductions into the Army and recruiting by industry.

The last registration apparently will make possible the first step in increased control of labor. Reports indicate that new registrants will be required to return questionnaires revealing skills and status of employment, with the idea that the information will be used as a means of spotting skilled men and encouraging them to move voluntarily into industries more in need of their services.

If this plan does not solve the problem, an executive order and legislation to permit shifting workers are the next steps reported under consideration. Requests for deferment of "essential" or "key" men

must continue to be presented individually to the draft boards having jurisdiction.

Storage Plugged

WITH producers, wholesalers, retailers and allied interests actively promoting the storage of coal under the leadership of the Office of Solid Fuels Coordination, WPB came to the bat with General Inventory Order No. M-97 on Feb. 13 specifically revoking the inventory restrictions imposed by Priorities Regulation No. 1 in so far as they apply to coal and coke.

To enable the transportation systems of the country to do a better job, permission for them to pool their resources during the war emergency was formally granted them by the government Feb. 17. Thus, railroads, bus and truck lines, steamship companies and other common carriers are permitted to join in any necessary cooperative plan with government sanction.

Fuel Control

NATURAL GAS probably acquired the distinction last month of being the first fuel to be rationed in the present war effort, if one discounts last fall's abortive attempt to curtail gasoline consumption. In an order issued Feb. 15, WPB restricted the use of natural and mixed gas in Alabama, Arkansas, California, District of Columbia, Georgia, Illinois, Indiana, Kentucky, Maryland, Michigan, Mississippi, Missouri, New York, Ohio, Pennsylvania, Tennessee, Virginia and West Virginia, effective March 1, with a proviso that the order would apply elsewhere only when a shortage exists or is imminent (see news section for complete report). The possibility of oil rationing also was raised by Oil Coordinator Ickes in testifying before the House Interstate Commerce Committee Feb. 17 in favor of a new cross-country pipe line.

The gas restriction order, which exempts the manufactured product and is designed to assure adequate supplies of the natural product for war production, prohibits delivery to new structures for heating and to heating equipment that has been converted from some other fuel to gas unless such conversion is completed within ten days after issuance of the order. Delivery to any new non-residential consumer, or any increase in such deliveries, also is prohibited unless standby facilities are installed, the consumer can use no other fuel or permission is granted by the Director of Industry Operations.

Meanwhile, further steps were taken to assure proper functioning of the coal and related interests with the appointment Feb. 11 of an Industry Committee on Solid Fuels made up of representatives of bituminous and anthracite companies, coke producers, wholesalers and retailers, tidewater and Great Lakes dock operators, railroads and other transportation organizations, mine labor and the public. For further details, see the news section.

Coal Prices

ANNOUNCING that bituminous producers during the period Oct. 1, 1940-Sept. 30, 1941, had sold coal at prices averaging 12c. per ton over the minimums established under the Bituminous Coal Act of 1937, the Bituminous Coal Division stated early in February that steps were being taken to ascertain the extent of changes as a prelude to appropriate adjustments in minimums. Had producers sold at the minimums, their "realization" would have been $2.01. The actual average price was $2.13.

Current cost, to be used as a basis for establishing new minimums at some as yet unspecified time, was set at $2.1947 (weighted average for the U. S.) in findings in General Docket 21 released early in February. This is an increase of 10.63c. over the weighted average determined in Docket 15. By districts (see news section), the changes ranged from a decrease of 18.80c. to an increase of 56.72c.

Meantime, hearings on the question of setting maximum coal prices continued in February, with some speculation as to whether jurisdiction over such prices might not be taken by OPA under its new pricing and rationing powers, which provide, however, that such powers may be delegated to other agencies or authorities. OPA, however, did set maximums on Connellsville beehive furnace coke at $6 per ton f.o.b. cars and revised Schedule 29, covering byproduct prices.

Materials Scarcer

REFLECTING the growing pinch in metals, manufacturers of coal-mining equipment last month asked for forbearance on delays in deliveries. With orders for war purposes flowing into the steel mills at an accelerated rate, indications were that business carrying no preference rating or priorities higher than A-3 would be held back for some time. The growing tightness in steel and other metals also was matched by rumors that priorities would be revised to give essential industries a better chance at available supplies, while the Mines Priorities Branch continued to stress the necessity of producers advising WPB and suppliers of their probable future needs.

The need for rubber conservation resulted in further restrictions on its use, topped off by the institution of rationing of recapped or retreaded tires and recapping or retreading materials effective Feb. 19. More stringent specifications on the use of rubber in such items as conveyor and transmission belts, hose, electrical wire and cable and many other products were set up. De luxe grades are scheduled for abandonment, although the set-up provides that such items as conveyors and transmission belts, etc., will be available in necessary quantities.

Manufacturers of electrical cables will continue to fill orders and such cables may be obtained as usual through the Mines Priorities Branch. Mine operators having difficulty obtaining tires may apply to State Administrators, it is stated, who have been assigned quotas for special distribution in addition to a special WPB reservoir. All priority forms and orders, with a few exceptions, may now be reproduced according to the terms of Regulation No. 5, issued Feb. 5.

BIG CARS BEHIND LOADERS

Plus Underground Transfer Station Increase Machine Output at Peerless Mine

Loading machines, tests have shown, average 75 tons more per shift at Peerless mine as a result of the installation of 8-ton drop-bottom cars and an underground transfer station for reloading the coal into the original 2-ton equipment for hoisting. Ten of these cars, with six gathering locomotives, handle over 1,100 tons per shift from three track-mounted loading machines in spite of an adverse change in conditions.

By IVAN A. GIVEN
Associate Editor, Coal Age

LOADING MACHINES have been enabled to produce about 75 tons more per shift with smaller crews as a result of the installation of big drop-bottom cars and a transfer station, or ramp, at the Peerless mine, Templeton Coal Co., near Sullivan, Ind. An old operation with a small shaft, the mine previously had relied on wooden cars holding, until conditions changed adversely about the end of 1939, approximately 3,900 lb. For maximum output, three changing locomotives were used behind each loading machine, and on that basis an average shift's work under the original conditions was considered to be 200 cars. The same cars still are employed behind those loading machines not served by the ramp, as well as for main-line haulage and hoisting of ramp coal.

The increase of 75 tons in machine production with big cars is not an increase over the output obtained under the conditions originally prevailing in the mine. Rather, it is the difference between what the production would have been with small cars under the adverse conditions lately encountered and what it actually is with big cars under identical conditions. Thus, though the big cars so far have not bettered performance as compared with the old days they have prevented what would have been a material drop with the smaller equipment and a larger crew.

Reasons for the installation of the big cars and ramp were several. A major one was a decrease in the height of the seam, necessitating cutting down the rear ends and thus reducing original car capacity 200 to 300 lb. This, in conjunction with a lengthening main-line haul, made a growing car shortage still more acute. Templeton officials also foresaw considerable advantage in the fact that, where conditions would permit, only 50 changes would be required for a normal loading-machine tonnage, against the previous standard of 200, saving in haulage equipment and labor, improving working conditions, and providing more opportunity for making up delays, since, for the same tonnage, car-changing time would be cut to one-fourth. Safety would be promoted by reducing the number of couplings and other operations for a given tonnage.

On top of that there was the further possibility of even higher loading-machine output growing out of the reduction in changing time. While the latter has not yet been realized, since the territory in which the first ramp set-up was made is characterized by thinner coal, bad top and very heavy grades, the big cars have enabled the loading equipment they serve to maintain nearly its former production level, whereas, if small cars had been continued, the loss, as stated, would have been 75 tons or more per machine-shift. This loss figure was determined from performance with small cars on the few occasions the ramp has been shut down for revisions or repairs, it being the first of its particular type and therefore requiring the usual adaptation to actual operating conditions.

Peerless works the Glendora, a "stray" seam in approximately the same position as the No. 5 but quite different in character. Thickness in the workings served by the ramp is 6 to 7 ft., although it drops to as low as 4½ ft. in nearby territory and to 2½ ft. or less somewhat farther south. With the present equipment, mining probably will be carried down to 5 to 5½ ft. In the older workings, thickness ranged from 7 to 9 ft. Cover thickness now averages 250 ft., and local grades up to 22 per cent are encountered. The top is a thick gray slate, the lower part of which, with gas pressure an added factor, tends to separate and fall. Plenty of timber therefore is a necessity, with the minimum two rows of posts on each side of the track in rooms, frequently supplemented by extra posts and crossbars 6 to 8 in. thick.

Production equipment at Peerless, aside from cars, locomotives, etc., consists of Goodman 260-A track-mounted loading machines (one 360 now in development), Goodman track-mounted bottom cutters and Chicago Pneumatic post-mounted drills. Changing locomotives are 6-ton General Electric cable-reel units. The panel system of mining is used, a normal panel consisting of ten rooms on a side, although there are many variations to meet special conditions. Standard room width is 26 ft.; centers, 45 ft. Usual depth is 300 to 400

Loading conveyors fill small cars through a crosscut.

Small car just filled underneath the loading conveyor.

ft. Rooms are turned on a 45-deg. angle for about 40 ft. and then are straightened up to 90 deg.

Room tracks generally are connected through the first crosscuts, and as the rooms advance one or more pickups may be made to shorten changing distance. Panels are opened up by development machines, which drive out the entries, neck the rooms and drive them in past the first crosscuts and the turning points. Track and switches then are laid, other facilities are put in order and a panel then is ready for a production machine, which advances all places abreast. The practice is to keep at least 12 places available per machine, with 15 or more where possible.

Operation with the ramp and big cars started in October, 1940. Details of the installation were worked out largely by William Cunningham, general superintendent; H. A. Keenan, mine superintendent; J. W. Anstead, electrical engineer; and L. M. Van Arsdal, mining engineer, in consultation with the Goodman Manufacturing Co., which supplied the hopper and elevating conveyors for the ramp, and the Sanford-Day Iron Works Co., which furnished the big cars. These cars, of the "1-2-3 automatic" drop-bottom type with 16-in. S-D "Floater" wheels (New Departure ball bearings), have a normal capacity of 8 tons where the coal is of the usual thickness. Length inside is 15 ft.; width, 6 ft. 9 in. Height over the rail is 42 in., except at the rear end, where it is cut down to 28 in. so that the rear loader conveyor, in low coal, can be dropped down into the car body. Provision is made for a 16-in. drop board on the rear end for thicker coal.

Ten of these cars were purchased. Three instead of a larger number of drop doors were specified because of the larger lumps encountered, even though this required deepening the hopper. These ten cars serve three loading machines and handle, under present conditions, 1,100 tons or more per shift. Where the distance from ramp to loading machine is less than about 1,500 ft., two cars, each with its own 6-ton locomotive, are used, the cars shuttling back and forth. On longer hauls, four cars are assigned

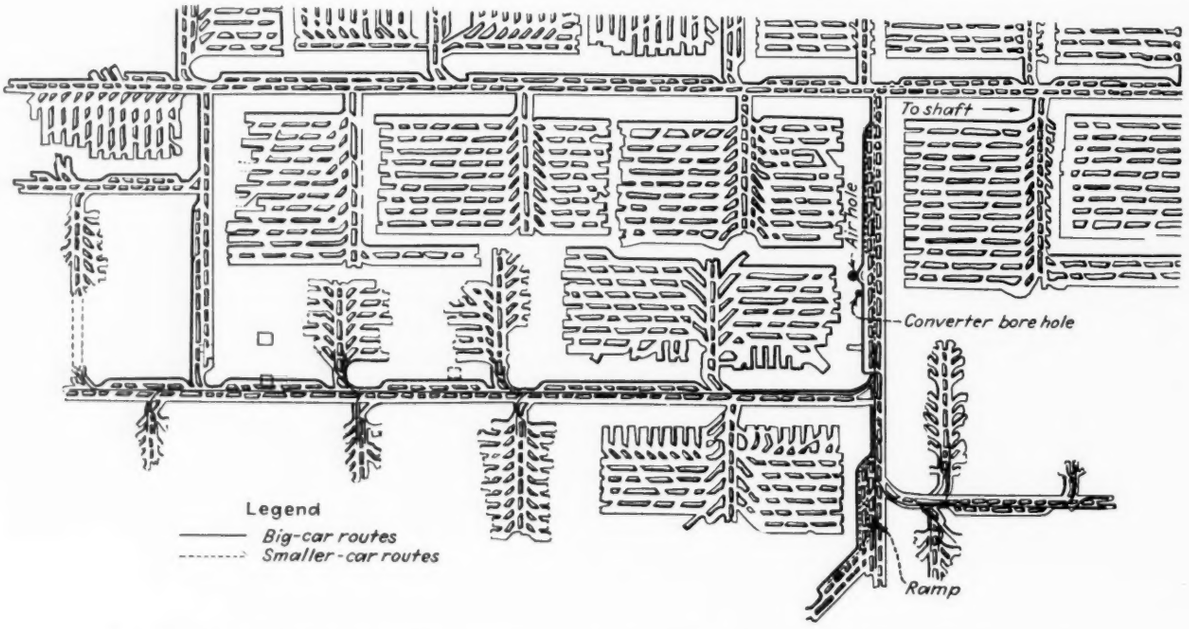


Fig. 1—First big-car set-up at Peerless, showing ramp location, sections served and big- and small-car routes.

to a machine, each of the two changing locomotives taking two. While one locomotive is making the trip to the ramp and back, the second gets one car filled, switches it into the nearest place, then gets the other filled. It then switches in and couples to the first load, letting the first locomotive back in with two cars. The triprider, one for the two units, who throws switches, couples, etc., then holds up the cable to let it out for the journey to the ramp.

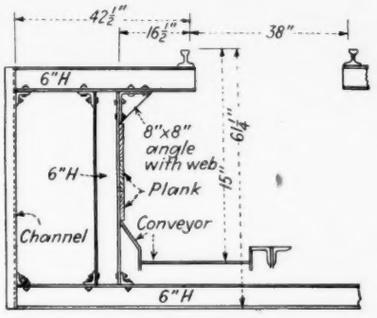
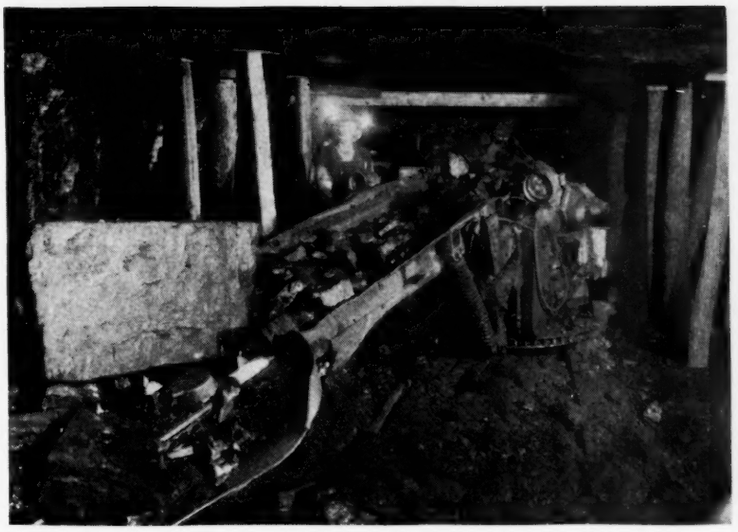


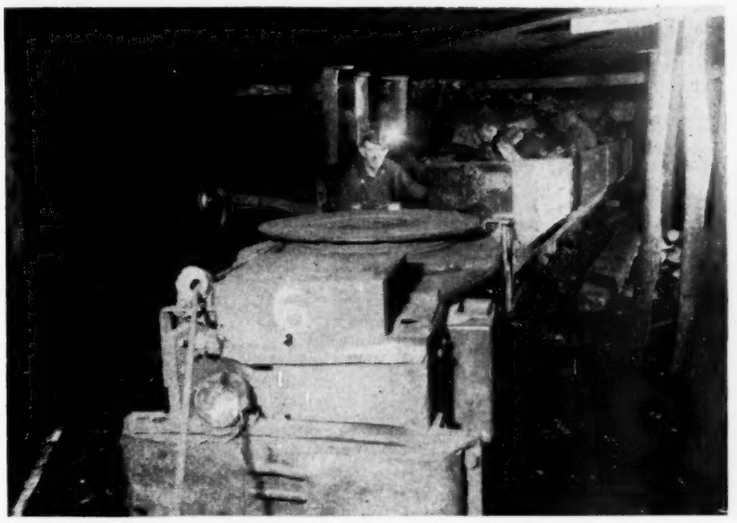
Fig. 2—Diagrammatic sketch of demountable cradle used with hopper.

Working sections are laid with 40-lb. rail and No. 2½ frogs. Experience has shown that on the heavy local grades, a 6-ton locomotive can handle a single big car (7 to 8 tons of coal) more easily than two little cars (4 tons maximum). And the big cars lend themselves to working low coal because they still have good capacity, whereas cutting down the ends on the others sufficient to drop the rear conveyor clear in would reduce their capacity so much as to make them useless.

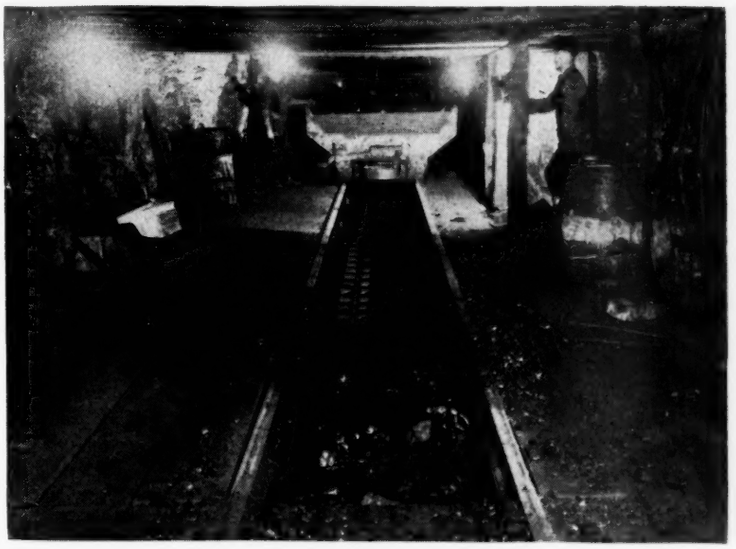
Ramp location, big- and small-car routes and working sections are shown in Fig. 1. The ramp was figured to handle an average of 1,500 tons in 7 hours. It consists of a hopper about 60 ft. long and 51 in. deep from the top of the rail to the bottoms of the conveyors, plus an inclined elevating conveyor for transferring the coal to the small cars in an adjacent heading. The bottom of the hopper consists of two Goodman 91-E chain conveyors with 17-in. flights, each driven by a 10-hp. motor (replacing the original 7½-hp. equipment). The hopper is cradled in a framework of 6-in. H-beams and channels (Fig. 2), which is designed with the various members bolted together to facilitate moving. Above the conveyor sides the hopper is lagged with plank. A high peak originally between the conveyors was cut down



Loading machine at work in a room. Note lumpy nature of coal.



One or two 8-ton cars are handled by a 6-ton locomotive.



Hopper installation for big cars at Peerless.

when it was found that large lumps frequently would balance on it above the chains and thus would not move out.

Height required to install the hopper is about 10 ft., which is obtained by taking top over the hopper location and, unless a swag is available, inclining the tracks up to it. The initial set-up was made in an entry where the headings were on 26-ft. centers, necessitating a loading-conveyor inclination of approximately 30 deg. As in the case of the hopper, two conveyors set side by side and each driven by a 10-hp. motor are used to load trips of small cars through a crosscut. The center peak also was removed from between the loading conveyors to facilitate handling lumps. In future installations, heading centers will be increased to 35 or 40 ft. to reduce conveyor inclination to 10 to 15 deg. In loading small cars, a trip is brought in by a 6-ton locomotive and shoved back of the conveyors. The trip then is pulled out a car length at a time for loading and then goes out a bypass track to the main parting.

Ramp employees normally number four, as follows: dumper, who controls big-car movement by means of signal lights; loading-conveyor operator, also supplied with signal buttons to control car spotting; and two motormen, one spotting under the loading conveyors while the second exchanges a loaded trip for empties. Further service to a loading machine is handled by two motormen and a triprider. This compares with three motormen and two or three tripriders under the normal small-car set-up. As a result, three loading machines now are operated by 42 to 45 men, plus four more at the ramp, compared with an average of 54 for three units each with small cars and three locomotives. In addition, as previously pointed out, production is very nearly as much in spite of much more adverse conditions in the territory now being worked.

NEW SHOVEL OPERATION

And 14-Yd. Dragline for Rider Work Mark Advances at Maumee Mines in Indiana

A NEW MINE in the Indiana Sixth Vein and installation of a 14-cu.yd. walking dragline to work in combination with the original 23-cu.yd. electric shovel in recovering two seams at the Linton No. 23-Sponsler No. 24 mines are the latest steps in the improvement and expansion program at Indiana operations of the Maumee Collieries Co. Coal from the new No. 26 operation, sold under the "Sycamore" trademark, is hauled by rail to the No. 23 plant, originally erected to prepare "Linton" coal from No. 23 and "Sponsler" coal from No. 24, and now serving all three operations.

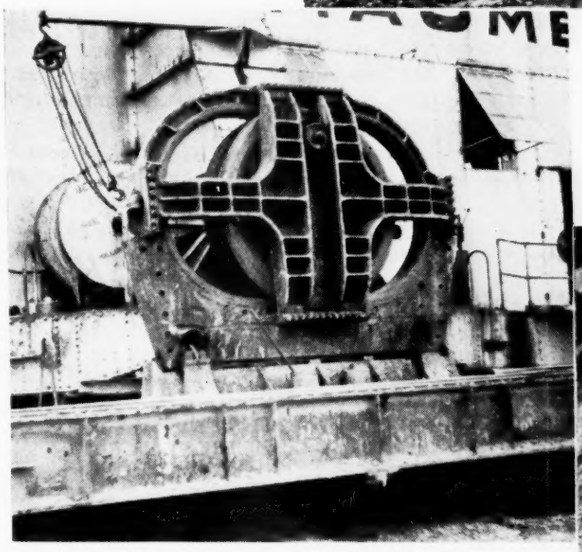
Linton No. 23, just south of Linton, Ind., was opened in 1937, and the equipment used at No. 19, which it replaced, was transferred to the new operation, involving, among other things, moving the Marion 5480 stripping shovel five miles overland (*Coal Age*, September, 1938, p. 29). This shovel and a 480 loader were put in operation recovering the main Fourth Vein (Linton No. 23), while recovery of the thin rider seam (Sponsler No. 24), prepared and sold separately, was contracted. Now the new walking dragline strips the rider and at the same time reduces the overburden on the main seam.

Detailing, construction of equipment and erection of the No. 23 plant was handled by the Maumee organization, working from a general layout prepared by McNally-Pittsburg, which also supplied the washbox, handling coal up to 6 or 8 in. in size. Seven-hour capacity of the plant is approximately 2,100 to 2,200 tons, and auxiliary equipment includes a Christie heat dryer for minus ⅜-in. coal, which may be loaded separately or mixed. Maumee also has devised its own waxing system, using a Viking motor-driven pump. Each loading boom is provided with a reservoir made from a short piece of standard pipe. Each such reservoir is equipped with two immersion-type electric heaters, each on an independent circuit, for control of heat. Seven loading tracks and complete mixing facilities round out the equipment.

The 5480 electric stripper, which started work at the old No. 19 operation in 1931, originally was equipped with a 14-cu.yd. dipper. In reconditioning before it was moved, a 19-cu.yd. dipper was installed. The present dipper is a 23-cu.yd. unit built in the Maumee shops. Use of high-tensile steel for the new dipper made it possible to maintain the original gross weight in spite of the increased capacity. With a 92½-ft. boom and 54-ft. stick, the No. 23 shovel can strip to a maximum depth of 48 ft. on a straightaway cut and 55 ft. on an outside curve.

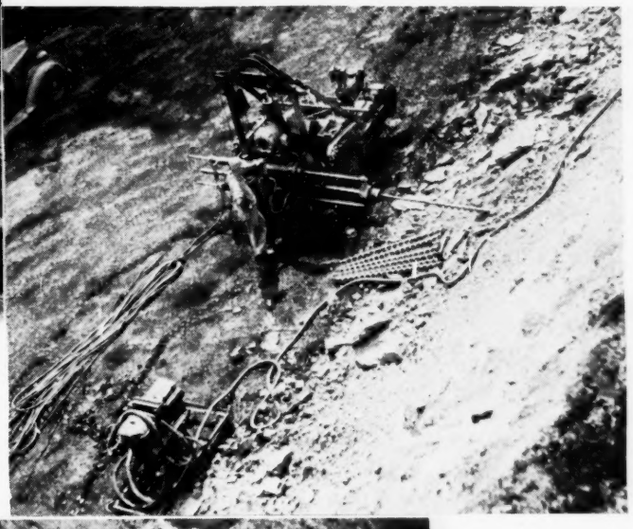
Installation of the walking dragline late in 1940 has permitted recovery of the rider seam without the necessity of the shovel rehandling the spoil. Thus the burden on the shovel is correspondingly reduced and its ability to uncover Fourth Vein coal correspondingly increased. Thickness of the Fourth Vein is about 36 in. The interval between the Fourth Vein and the rider seam is about 30 ft. in the present workings. Cover over the rider seam, 16 to 17 in. thick, is approximately 25 ft., making the total cover on the Fourth Vein about 55 to

In the foreground is the 14-cu.yd. walking dragline which strips the rider seam at No. 23 mine. Also shown are the 23-cu.yd. stripping shovel and 4-cu.yd. loader.



Walking gear and shoe on No. 23 dragline.

This No. 23 sidewall drill was designed and built by Maumee.



Loading in the No. 23 shovel pit.

56 ft., with some reduction toward the Fourth Vein outcrop.

This new dragline, a 15-W Bucyrus-Monighan, carries, as stated, a 14-cu.yd. bucket on a 215-ft. boom. Its weight is 830 tons. The tub diameter is 36 ft. Walking shoes have an area of 614 sq.ft. An auxiliary fulcrum structure facilitates changing boom position. The drag-rope outlet is raised to keep the rope out of the bank and reduce wear. Controls are in a cab on top of the house to give the operator a broader view of his work.

Briefly stated, the working plant at No. 23 is based on the dragline handling the burden over the rider seam, leaving the interval over the Fourth Vein to the shovel. Under this plan, the shovel works ahead on a cut already cleared by the dragline, and by the loading of the rider coal. The dragline, working from a position on top of the interval, follows along behind, stripping the rider and clearing the way for a new cut by the shovel. Shovel-cut width is 45 to 50 ft., and when the interval must be shot it is drilled with a horizontal machine designed and built by Maumee. Holes are made in a shale stratum just over the coal. A 30-ft. coal berm is left for haulage, making the shovel-pit width approximately 75 to 80 ft. The 215-ft. boom enables the dragline to throw the rider spoil all the way across this pit and across the spoil row left by the shovel, thus getting it entirely out of the way.

Linton coal is loaded in the No. 23 shovel pit by a 490 shovel. Sponsler coal from the No. 24 rider-seam operation is handled by a 480 unit. Since the rider is quite thin, the output usually is not more than enough to run the washer two shifts a week—the second shift in each case. Haulage from both the shovel pit and the rider workings is handled by three Autocar tractors pulling 20-ton Austin-Western trail cars, and two Dart tractors with 25-ton trail cars. The rider-seam workings are reached by a ramp graded up from the shovel pit.

The 15-W dragline is powered by a General Electric six-unit 1,800-r.p.m. motor-generator set with mill-type motors for hoist and swing. The m.g. set is made up of a 650-hp. 4,000-volt synchronous motor, two 165-kw. hoist generators, two 112½-kw. swing generators and a 25-kw. exciter, all with ball bearings. Hoist and swing generators are equipped with the recently developed "V" brush holders (National brushes), designed to insure better commutation.

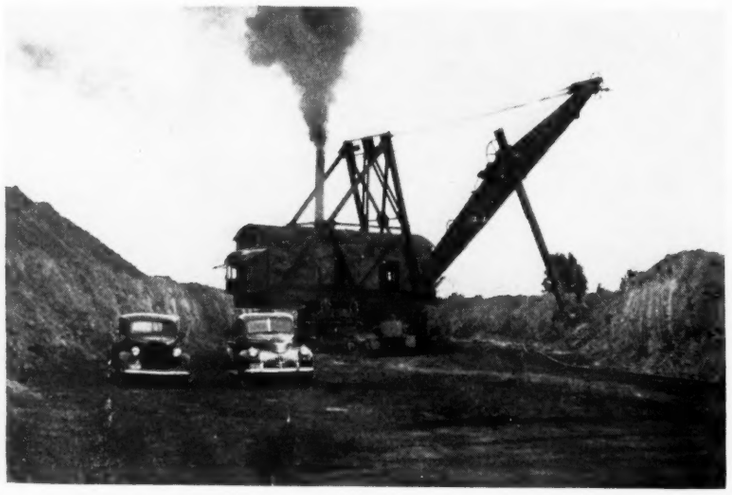
The hoist motors are 187½-hp. units. Swing motors have a 125-hp. rating for quick acceleration and a fast swing. Generator voltage is 250; exciter, 125. Rated voltage of the operating motors is 230. The system of operation is the Ward Leonard.

Sycamore No. 26 mine, 4½ miles west of Linton on the Bushrod branch of the Pennsylvania R.R., went into operation Aug. 20, 1941. Good overburden and loading conditions are the rule. Coal thickness (Sixth Vein) is just under 6 ft., while the overburden averages somewhat less than 30 ft., making the ratio approximately 5:1. The haul starts at less than 100 ft. and the maximum for the next five years will be less than one mile. Except where held back by removal of the coal, the water will run out of the pit.

Stripping is handled by a Marion steam shovel rebuilt in the Maumee shops and equipped with a 10-cu.yd. dipper and caterpillar running gear. The loading shovel is another Marion steamer, also rebuilt with a larger boiler and dipper. Auxiliary equipment includes a tractor and bulldozer for coal cleaning and general use, an electric coal drill and electrically operated pit pumps.

The coal is hauled in dump trucks to a transfer station, consisting of hopper, feeder and inclined scraper conveyor discharging into railroad cars. Trackage is available for handling 2,500 tons per shift, which figure already has been reached. The coal is hauled in railroad cars to the No. 23 plant, on the Pennsylvania and Milwaukee tracks, for washing, other preparation and loading in the standard Indiana sizes. Sycamore No. 26 officials include Oscar Wolf, superintendent; George W. Rea, general superintendent; and James R. Harmon, master mechanic.

No. 26 transfer station, where coal is loaded into railroad cars for movement to the No. 23 plant for preparation.



Rebuilt steamer with 10-cu.yd. dipper on the job at No. 26 mine.

[SECOND OF TWO ARTICLES ON MODERNIZATION AT PITTSBURG & MIDWAY COAL MINING CO.]

MODERNIZATION PROGRAM

At Kansas Strip Mine Includes Use of Jig Method to Wash Large Sizes

By CHARLES LAMBUR JR.
Assistant Editor, Coal Age

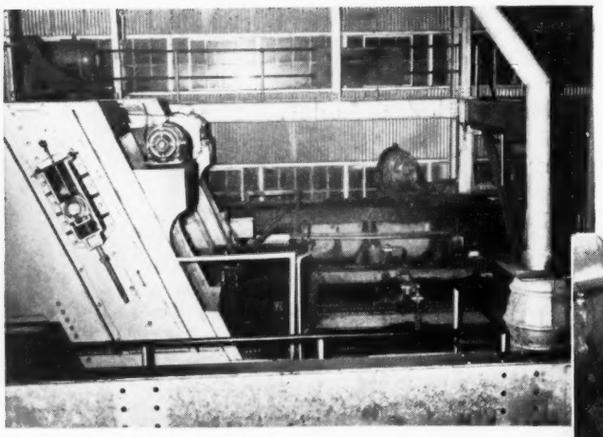
TO PREPARE the 2,500-ton-per-shift output of No. 15 and the 2,200-ton-per-shift production of No. 18 mine, Pittsburg & Midway Coal Mining Co., the central cleaning plant, West Mineral, Kan., was modernized with emphasis on doing a better job of cleaning at reduced cost with an increase in tonnage and particularly stoker size coal capacity. Originally it was a four-track 250-ton-per-hour raw-coal plant built in 1929 to serve only No. 15 mine. In 1933, a No. 17 mine was opened and its output shipped to West Mineral, making it into a central cleaning plant. Haulage by 50-ton railroad cars was standardized, and a rotary dump to empty them, a cone for washing minus 6-in., thickeners and a dryer were installed and the plant was enlarged to five tracks and 550-tons-per-hour output.

Two McNally-Norton wash boxes were added in 1934, of which one was a No. 4 box for minus ¾-in. screenings and the other a No. 3 box for cone and screenings middlings. In 1935, a fine-coal plant of four Deister Overstrom Diagonal-Deck coal-washing tables to wash minus 1-mm. was added. A plant to recover pyrite from refuse also was constructed at this time. No. 18 mine replaced No. 17 in November, 1940, and the central cleaning plant was modernized. Both the Missouri Pacific and Missouri-Kansas-Texas railroads enter the yards and a Santa Fe connection is made via the Missouri Pacific.

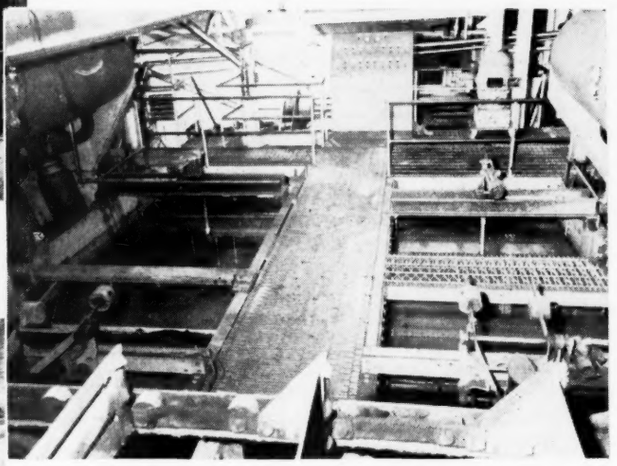
Output of No. 18 mine is from the Bevier seam and of No. 15 mine from the Mineral seam, each of different characteristics and necessary to wash separately. Therefore, car storage space, at least for a day's run, is necessary and totals 250. Usually 70 cars loaded with mine-run coal from one of the mines are on hand at the beginning of a shift. The hill above the rotary dump holds 70 and the high track 35 cars. They are emptied by a Link-Belt rotary dump into a 100-ton hopper. The hopper is emptied at 700 to 800 tons per hour by a reciprocating feeder into a 48-in. 50-ft. pan conveyor that feeds a 7-in. round-hole scalping screen. Minus 7-in. falls directly into the raw-coal conveyor.

Oversize is crushed to 7 in. by a McNally 36x48-in. adjustable double-roll crusher which feeds into the main raw-coal conveyor. This conveyor discharges onto 8x32 ft. of round-hole shaker screens which divide the feed into 7x1¼-in. and 1¼-in.x0. The 7x1¼-in. is carried at 350 tons an hour by a United Iron Works 36-in. drag conveyor to a No. 5 McNally-Norton automatic washer. Clean coal is sized to 7x3-, 3x2-, 2x1¼- and 1¼x¾-in. on three 8x8-ft. round-hole shaker classifying screens and passes into the mixing conveyor or is loaded directly into railroad cars. It is dewatered by a 12x8-ft. ¾-in. round-hole

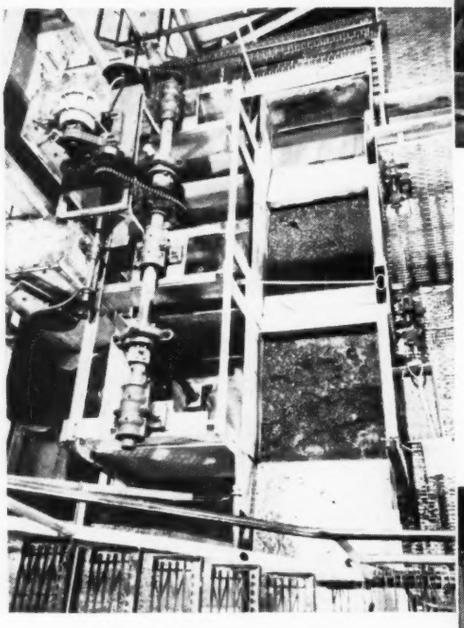
The rebuilt, modernized central cleaning plant with rotary dump in right foreground.



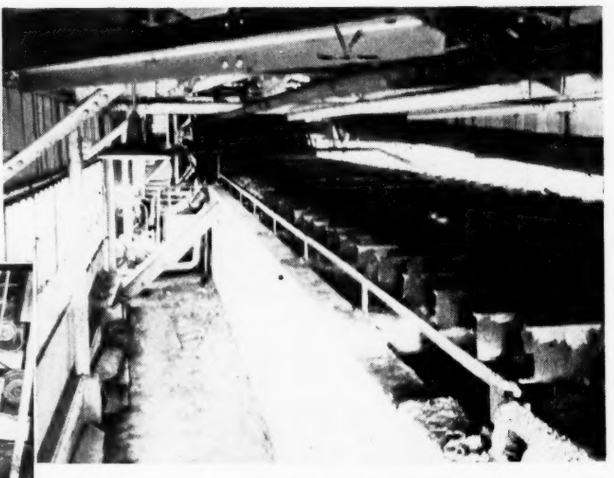
Wash box for 7x1¼-in. screened mine-run.



These two wash boxes clean minus 1¼-in. screenings.



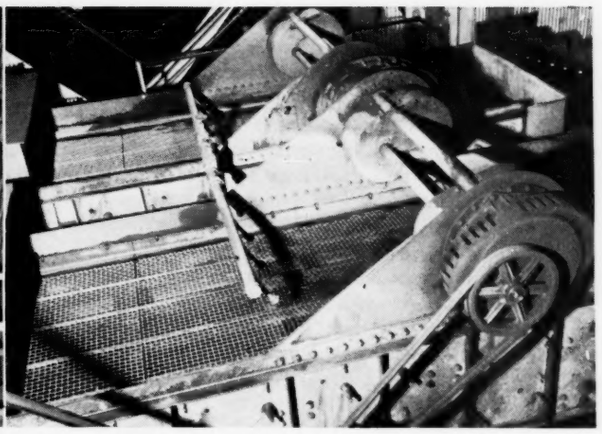
This jig cleans middlings from the two screenings washers.



Sludge and minus ¼-in. clean coal settle and are removed by drag conveyor from this concrete 105,000-gal. tank.

Minus 1-mm. fine coal is recovered by these four washing tables.

Scalping screen and double-roll crusher that makes run-of-mine into minus 7-in.



Two horizontal double-deck vibrators size washed screenings into 1¼x¾-in. and ¾x¼-in.

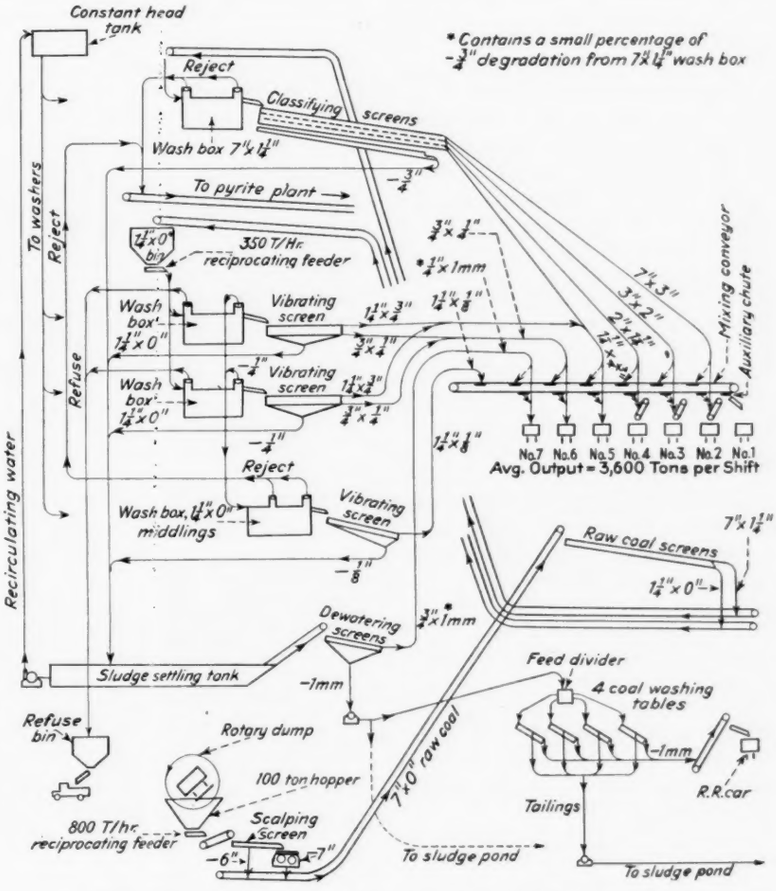
screen and the water and material passing the screen is sluiced to the sludge settling tank. The reject, both primary and secondary, is carried by a 24-in. 170-ft. belt to the pyrite recovery plant.

The 1¼-in. screenings travel by another 36-in. drag conveyor to a steel 40-ton surge bin, which is emptied at 350 tons per hour, by a reciprocating feeder, into a conveyor which delivers 60 per cent of the feed to a McNally-Norton No. 4 wash box and 40 per cent to a McNally-Norton No. 3 box. This arrangement assures the constant and uniform feed necessary for best jig operation on fine coal. Clean coal is sized by two Robins Eliptex horizontal 5x14-ft. double-deck vibrator screens that make 1¼x¾-in. and ¾x¼-in., which go into the mixing conveyor or are directly loaded into cars. The minus ¼-in. dewatering is sluiced to the settling tank.

Primary reject of both boxes is held in a 10-ton refuse bin and loaded into trucks for waste. Secondary reject is conveyed at 40 tons per hour to an Ore Reclamation Co. round-bottom (Hartz-type) jig wash box for final separation of middlings. Clean coal is sized to 1¼x⅛-in. by a Robins Gyrex 5x12-ft. vibrating screen and then enters the mixing conveyor. Minus ⅛-in. is sluiced to the settling tank. Both primary and secondary reject are conveyed onto the pyrite recovery-plant belt.

The sludge tank is reinforced concrete, 150 ft. long by 14 ft. wide and 10 ft. deep, with 105,000-gal. capacity and one end is sloped. A 14-ft.-wide 180-ft.-long conveyor drags the sludge onto three sections of 5x20-ft. 1-mm. wedge-wire dewatering screens. Plus 1-mm. goes to the mixing conveyor or is directly loaded into cars as minus ¼-in. It contains a little ¾-in. coal which is negligible, being degradation from the No. 5 wash box.

Minus 1-mm. is pumped by a Wilfley 3-in. centrifugal to four washing tables. They are fed from a divider box which permits accurate control to each table and 50 g.p.m. of fresh water is added per table. Minus 1-mm. clean coal is loaded into railroad cars by a 20-in. dewatering drag conveyor. Tailings (refuse) is pumped to the sludge pond by a Wilfley 3-in. centrifugal driven by a Westinghouse 10-hp. motor. Only two of the tables are used since the modernization program and each produces one ton of coal per hour compared with a previous total daily recovery of 50 and



Flow diagram for the rebuilt modernized central cleaning plant.

60 tons. Minus 1-mm. from the dewatering screens may bypass the tables and go directly to the sludge pond.

Water for the four wash boxes is supplied to a 6x6x14-ft. constant-head tank at the top of the plant from the sludge settling tank by one recirculating-water Dayton-Dowd double-suction 20x20-in. centrifugal pump, driven by a direct-connected General Electric 200-hp. 440-volt a.c. 705-r.p.m. Type KF motor. Use of a constant-head tank does away with several pumps required in the past and also gives more accurate control to each box because as pumps wear their output varies.

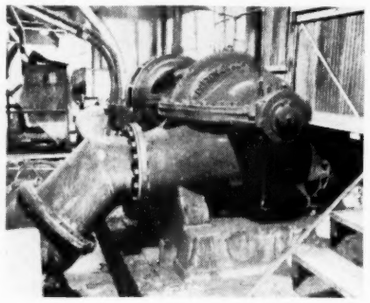
Average feed in gallons per minute is 5,500 to No. 5, 2,400 to No. 4, 2,000 to No. 3, and 700 to the O.R.C. wash box. The only fresh water added is 300 g.p.m. by sprays on the classifying and 350 g.p.m. on the dewatering screens and 50 g.p.m. to each washing table. Sprays are bronze of the duckbill type. A 3-in. Gould centrifugal pumps 350 g.p.m. from a 15,000-gal. standby tank and other fresh water is furnished by a 4-in. Worthington centrifugal from a 2,000,000-gal. strip-pit pond. The well supplying the tank is 1,040 ft. deep with water standing at 165 ft. and is continuously pumped by a Peerless turbine when the washery operates.

A 36-in. 200-ft. mixing conveyor extends over six tracks with a chute to No. 1 and makes 30 combinations. Standard sizes are 7x3-in. furnace on No. 2 track, 3x2-in. fancy nut on No. 3 track, 2x1¼-in. nut on No. 4 track, 1¼x¾-in. chestnut on No. 5 track, ¾x¼-in. household stoker on No. 6 track, and minus ¼-in. on No. 7 track. Tracks Nos. 2, 3 and 4 are loaded by pan-type conveyor booms, and Nos. 5, 6 and 7 by chutes. No. 1 track is an auxiliary.

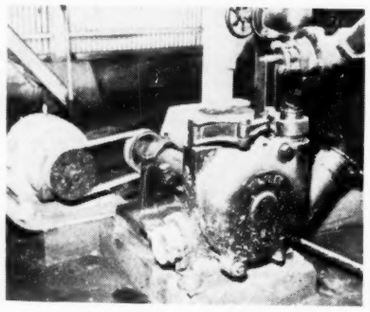
Oil-treating is by a specially designed system using a mixture of water, oil and an emulsifying agent, pumped by a 1-in. centrifugal from the emulsifying unit and applied through nozzles at the end of each boom and chute. Three gallons of mixture at 15-lb. pressure is used per ton of coal. Salt sometimes is added as an anti-freeze.

Plant control cannot depend upon sink-and-float analyses because of the varied seam characteristics. In like sizes washed under the same conditions ash varies as much as 3 per cent. Therefore, routine ash analysis is made each day for every car of 1¼-in. and smaller size coal. One man spends his entire time taking samples and averages 30 cars per day. These analyses are given the billing clerk who assigns shipments to satisfy each contract. Every two or three days a B.t.u. analysis is made. Reject of each wash box, the product of each screen, etc., is checked by sink-and-float analyses once or twice a week.

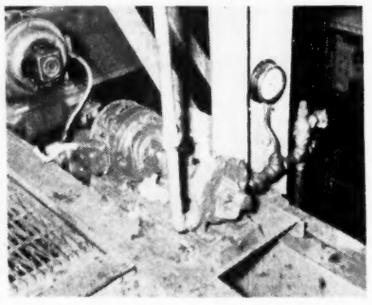
A total of nine men are employed in the plant: a hopper and crusher attendant; plant operator; screen attendant; No. 5 wash-box operator; Nos. 3 and 4 box operator; general attendant for pump, O.R.C. box, etc.; oiler; janitor and plant superintendent. Eleven men are employed outside the plant: five at the rotary dump, consisting of a loaded and an empty car rider, chunk breaker, signal man, dump operator; four car riders for prepared coal; one oil-treatment operator and one truck driver for refuse.



A 20x20-in. double suction centrifugal pump operated by a 200-hp. motor recirculates water from the settling tank to a constant-head tank feeding all washers.



One of the two centrifugals for pumping minus 1-mm. sludge and tailings to the sludge pond.



Dust is allayed by a ½-in. centrifugal pump which furnishes water at 100 lb. pressure to sprays at strategic points.

The plant is operated from three panels, one for No. 5 wash box, one for Nos. 3 and 4 boxes and their secondary equipment, and one for the rest of the plant. Pushbutton controls have been replaced by levers. All wiring is from terminal panels and is in conduit. An interesting feature of the electrical system is the arrangement of switching. Combination switches are used, breakers being employed rather than fuses.

Behind each switch are connections for meters which can be made without shutting down the unit, which is necessary with the usual arrangement of combination switches with jacks. This is important, as virtually daily checks are made of each motor for routine troubles, such as overloads, etc. Recording wattmeters of the Esterline-Angus type are used and determinations of power factor, voltage, etc., also are made.

Connected horsepower is about 1,200 and the largest motor is 200. Power is 440-volt a.c., with a 110-volt circuit for lights. Consumption is determined by company-owned meters, one at each shovel and one at the plant. However, the power company determines total consumption and 15-minute demand.

Dust is allayed by water sprays at the mine-run crusher, 1¼x0-in. bin, loading points of the 7x1¼-in. and 1¼x0-in. raw-coal conveyors and the mixing conveyor. A Micro-Westco ½-in. centrifugal pump furnishes water to these sprays at 100-lb. pressure. Fyr-Fyter quart and gallon extinguishers are at handy locations. Buffalo fan-type steam units furnish heat. Signal lights at three locations indicate plant operation. There are twelve welding outlets and an Alemite pressure system. Electrical and machine shops employ four welders, two blacksmiths, three machinists, five electricians and one truck mechanic for maintenance work who also service each mine and do some outside work.

From 15 to 20 per cent of mine-run is reject and 15 to 20 per cent of reject is pyrite. In 1935, it was decided to recover this pyrite and a two-unit plant averaging a total of 50 tons of pyrite per day was constructed. It is fed by the reject from No. 5 and the middlings wash boxes of the central cleaning plant, and after treatment by a series of crushers, vibrators, jigs and tables, 4-mesh pyrite is obtained. Tailings average 4 per cent coal and less than 1 per cent pyrite.

[THIRD OF A SERIES OF THREE ARTICLES ON ORIGIN AND MEANING OF POWER FACTOR]

HOW ILLINOIS MINES

Put Modern Electrical Equipment at Work

Improve Bad Power Factor and Lower Costs

By FRED W. RICHART
Editorial Staff, Coal Age

THROUGHOUT the country, in shaft and strip mines, motor-generator sets rated at 0.8 power factor have for many years been used to improve power factor. In almost all such applications the purpose has been a reduction of demand charges of purchased power bills. Little attention has yet been paid to the question of oversized conductors required to carry this leading current, to the extra power for overexciting synchronous motors, or to the heating of the motors themselves.

Since the return of coal washeries into fashion the need for power-factor correction has become more acute. At the same time, mechanization has steadied the load in underground mines and in many cases overloaded m.g. sets so much that it is very desirable they be operated at 100 per cent power factor.

Very few capacitor installations have, as yet, been made in Illinois to relieve the washery situation. Partial correction was made in one instance to boost incoming line voltage to get satisfactory motor operation. There are a few washers where small capacitors have been applied as a start toward a program to be completed later. No instance has come to light where all the debits and credits of a given situation have been set up in an effort to compare capacitors at the washery with supplying the necessary magnetizing current from miles inside the mine or from miles to the strip pit. There are, no doubt, many mines which merit this sort of an investigation before undertaking a remedy.

Considering the fact that power-line voltage frequently is above normal rating, there are many mining plants where leading current can be supplied only at impaired life of synchronous motors. Sometimes, voltage adjustments will help. Taps on power transformers are for that purpose.

There are a few mines in Illinois which use a.c. cutting and loading equipment, and conveyors. This introduces a power-factor problem underground. Whether capacitors are installed as a part of each underground transformer substation or as an aggregate on the surface will depend on the point of view of the management. Correction at the underground substation is logical if the utmost economy in power cables and transformers is desired. With the increased use of cables in mine operation, the reduction of current per conductor is important. As current increases, cable size must be increased in much greater proportion. Power factor is a serious element in determining cable sizes.

Representative examples shown herewith indicate a considerable range in capacity. More interesting are the reasons for making power-factor corrections in these installations and, particularly, the use of an idle engine-type generator as a rotary condenser.

Fig. 10 is a small capacitor in the fan house at Peabody Coal Co.'s Mine 18, West Frankfort, Ill. Since the fan operates 24 hours daily, the capacitor maintains the average power factor during the idle portion of the day.

Figs. 11 and 12 show a split installation of capacitor units totalling 315 kva. at Union Colliery Co., Dowell, Ill. Of this, 180 kva. is mounted on the outdoor substation structure and connected to the lines through fused cutouts. The 135-kva. set in the hoist room is arranged for switching. Its function is to improve tipple power factor. The voltage of these units is 2,300. This installation raised the average mine power factor from approximately 94 to 99.9; even better than was anticipated. The savings are expected to return the cost in about ten months.

Fig. 13 is the 660-kva. capacitor layout at the Valier Coal Co., Valier, Ill. It consists of three units, all arranged for switching, as conditions may demand. The larger unit is 360 kva. and the balance is divided between the other two. This mine uses a.c. cutting and loading machines. Curiously enough, the required reactive kva. is almost exactly the same for working as for idle portions of the day. This installation was made to reduce the demand charges, and has proved to be a very satisfactory investment.

The three installations noted above use purchased electric power.

A quite different need for power-factor improvement was the motive behind the Bell & Zoller Coal & Mining Co. arrangement at Zeigler, Ill. Two mines are located approximately two miles apart, each with its own electric power plant. A washery at the No. 2 mine was to be driven by the power plant at the No. 1 mine under certain

conditions. The transmission line consisted of two 2,300-volt 3-wire 4/0 circuits, one of which had some 3/0 copper in it. The distance is 12,000 ft. and the load carried about 1,400 kw. Without power-factor correction, the voltage drop was 460, and it was necessary to run the generator voltage up to 2,660.

At mine No. 2 was a 675-kva. engine-driven a.c. generator not in service (Fig. 14). The engine was disconnected. A motor, to bring the generator up to synchronous speed, was belted to the exciter driving pulley, using a multiple belt. Floated on the line as a rotary condenser, this rig brought the line drop down to 300 volts. The actual power saving is more than 100 kw., while the generator voltage was brought down to 2,590.

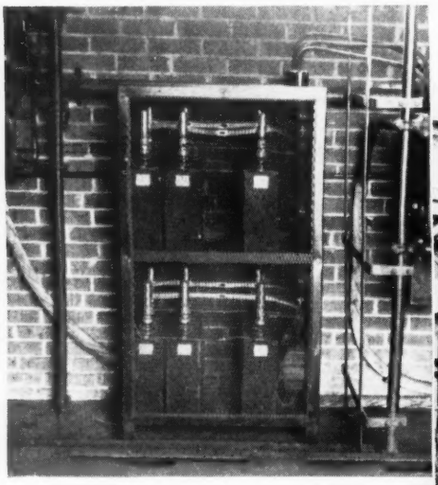


Fig. 10—Capacitor installation, Black Arrow No. 18 mine, Peabody Coal Co.

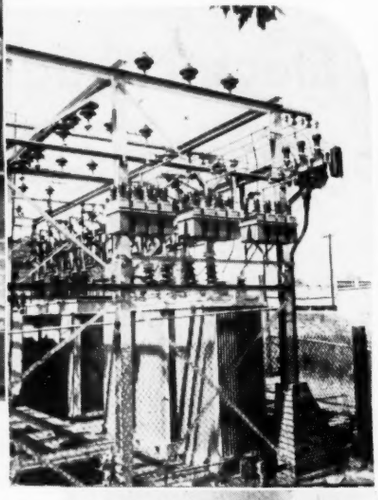


Fig. 11—Capacitor units (180 kva.) in outdoor substation at Kathleen mine, Union Colliery Co.

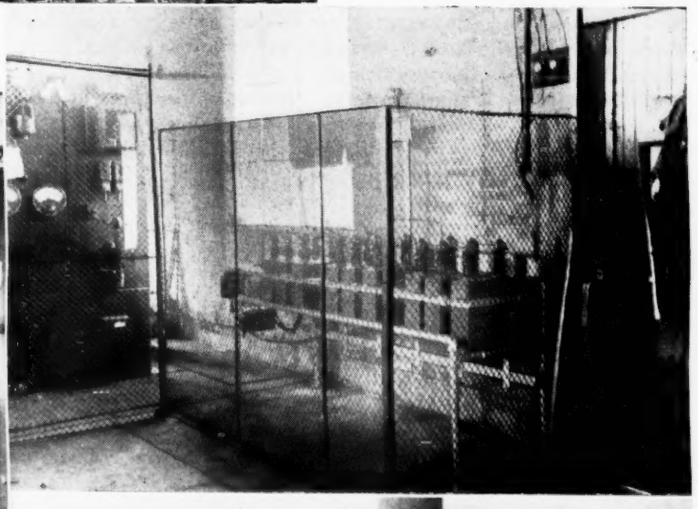


Fig. 12—Remainder of Kathleen equipment (135 kva.), in hoist room.

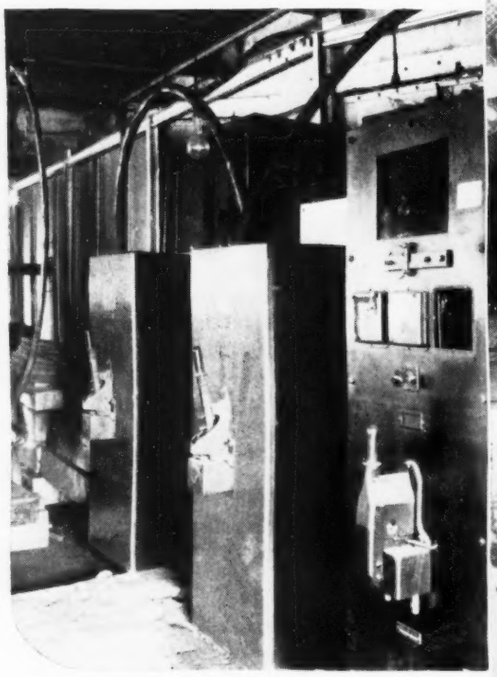


Fig. 13—660-kva. capacitor installation at Valier mine, Valier Coal Co.

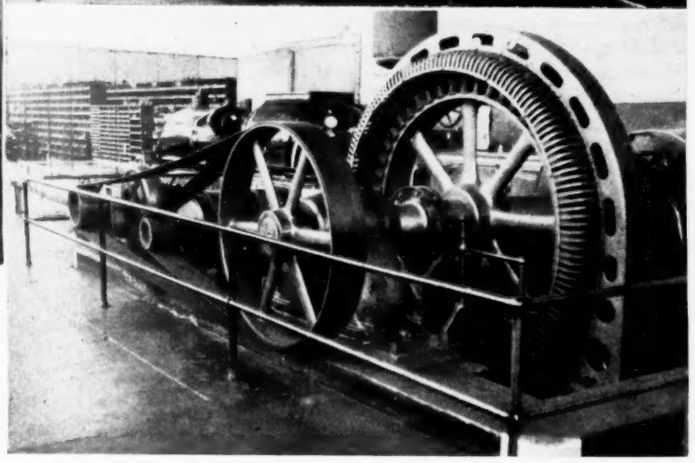


Fig. 14—Synchronous condenser used to improve line conditions at the Zeigler mines, Bell & Zoller Coal & Mining Co.

FIFTH OF A SERIES OF ARTICLES
ON HUMAN RELATIONS AND PERSONNEL BUILDING
IN THE COAL-MINING INDUSTRY

MANAGEMENT POLICIES

Influence Accomplishments of Bosses And Make or Break Supervision at the Face

By O. G. VAN CAMPEN
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DURING the last ten years, the American people have become acquainted with a unique individual. He wears a coat of many colors and appears in many guises. That unique character is the "forgotten man." The coal industry is equally up to the minute. It too has its "forgotten man." He is lost somewhere between the general mine foreman and the mule driver. He is the assistant foreman or some other boss of like character and responsibilities.

It will be readily agreed that the job of the supervisor is to get others to do the things that must be done. The point upon which top management is not wholly in agreement, however, is that the methods used by the supervisor in his struggle to get things done are influenced largely by the treatment accorded him by said top management.

Clear Policy Essential

Notwithstanding recent developments in other phases of American industry, it is difficult to bring home to many coal-mining executives the importance of a clearly defined company policy. The vice president of an operating company once remarked: "I can't see any sense in putting a lot of stuff on paper on this company-policy business. After all, I am running the company, and the company policy is bound to be my policy." In this statement is found the seed of the bad management that results in supervisory failures in coal mining. When company policy is the product of one man's mind it is subject to all the inconsistencies of temperament, prejudice and illogical thinking that are bound to be found in the make-up of one man.

Supervision, if it is to be effective and constructive, must be backed up by the kind of consistent, creative company policy that builds into the supervisor a strong sense of self-value and self-respect, security in his job and recognition of his importance as an executive, and must emphasize the qualities in the supervisor that the company wishes the supervisor to emphasize in those who work under his direction. Company policy is not a device that can be stressed today and forgotten tomorrow. Nor can it be built up overnight. The foundations are to be found in the daily instructions, written or spoken; in the standard work practice or daily procedure; and in a careful analytical study of the human factors and human relationships that exist in the daily activities of the working force.

It has been well said that company policy is not company policy unless: (1) it is written for the record; (2) it states objectives; (3) it outlines procedures which make for the accomplishment of the objectives; and (4) it prescribes the personnel involved in carrying out the procedures. Company policy, in the last analysis, is a plan of action. It is not only descriptive and regulatory but also functional. Company policy should specifically enumerate and describe all circumstances, factors and authorities involved in all procedures, and should specifically define the attitude of management toward human relations. The more specific company policy is on this point, the more prejudice, snap judgment and abuse of authority will be eliminated.

Those whose task it has been to define, develop and write out company policy agree that during the proceedings, conferences, etc., a new insight is gained into the entire organization, many weaknesses in management are discovered and corrected, new incentives are set up and new methods of building organization morale are recognized. It cannot be emphasized too strongly that management which "cracks down" and penalizes only when emergencies arise is destructive. High morale, confidence in management, a spirit of cooperation, and effective supervision are the fruits of long-maintained and consistent company policies.

Management Attitude Vital

Coincident with the development of sound company policy must come a deeper appreciation by management of the qualities and capacities absolutely necessary to effective supervision. Consideration must be given not only to the work experience and skills needed by a supervisor but also to such qualifications as leadership, creative ability and behavior habits which make for more harmonious human relations. The complicated task of solving the problems presented by our nation at war, such as an expanding working force, the need for maximum output in a minimum of time and the problem of reshaping conflict and friction into unity and cooperation, calls

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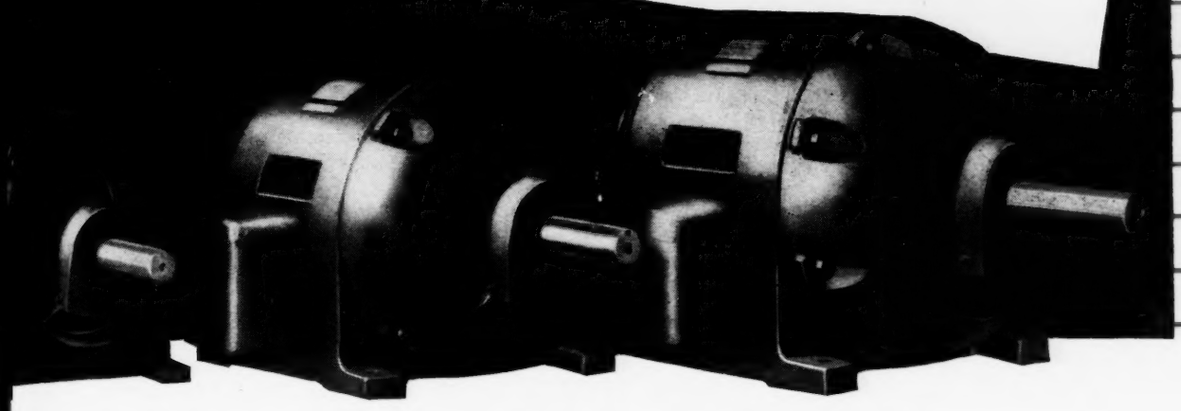

75 hp
60 hp
50 hp
40 hp
30 hp
25 hp
20 hp
15 hp
10 hp
7½ hp
5 hp
3 hp
2 hp
1½ hp
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for that type of thought and action found only in constructive, creative leadership—leadership in which workers can believe, in which every employee will receive prompt recognition of his efforts and ability.

Good leadership inspires confidence. It builds a steady enduring enthusiasm and, above all, it develops the will to get things done. The resulting spirit is expressed in a united driving power. More than anything, however, good leadership brings out and develops the skills of those under its influence. It builds men.

Many people tend to regard leadership as a gift or some mysterious intangible. Good leadership is not a quality or a collection of qualities. It is what a man does and how he does it. It is the whole man in action, the man who indicates in his daily performance that he has the physical stamina, the emotional drive and the creative intelligence to successfully meet the problems of production. Worthful action and not intangible virtues determine whether an individual is capable of leadership.

What Makes a Leader

When leadership is considered in the light of action or behavior, management can develop a practical yardstick for the selection of supervisors and set up practical training programs that will develop leaders. To find out "What type and kind of person makes an outstanding leader" many leaders in industry were studied. The following were shown to be their most pronounced characteristics. Blended together, they make as perfect a leader as one can hope for.

A leader of men must be forceful and have a high energy output. Among his characteristics are:

1. The will to get things done—prompt action with constant "follow-through"; ability to hold to schedule.

2. Ability to energize those under him—vital personality; a dynamo whose power is felt by every worker.

The leader can stand on his own feet, meaning he possesses:

1. Self-confidence and self-reliance—wins the confidence of those under him; workers feel secure in his leadership.

2. Emotional stability — a man steady under pressure; not moody or changeable; grown-up in his feelings; keeps the promises he makes; sticks to plans; dependable.

3. Eagerness for responsibility—ready to take his share of the supervisory responsibility; accepts responsibility for his own mistakes; squarely faces difficult situations.

A good leader must have understanding and insight. This requirement can be broken down as follows:

1. High level of intelligence—observes quickly and accurately; comprehends swiftly; learns rapidly.

2. Analytical ability and sound judgment—can be impersonal, draw conclusions and base judgments on analysis of the facts; judgment not distorted by feelings.

3. Open-mindedness—alert to new ideas and new methods; inquiring open mind; always seeking to increase knowledge.

Must Develop Men

Ability to develop those under him is a mark of the good leader and is the very heart of good leadership. Under this heading are found:

1. A genuine liking for people—keenly interested in the problems and successes of his associates and those under him.

2. A sincere desire to make the workers feel important—ready to give full credit where credit is due; makes workers feel they are performing important tasks; recognizes the abilities of others.

3. Insight into human motives—understands the urges that drive workers and guides these drives into constructive channels.

4. Good teaching ability—trains workers to perform their tasks well; encourages them to develop latent talents.

A successful leader must be a constructive and creative thinker, meaning, among other things, that he:

1. Avoids mental ruts—maintains good housekeeping and good working conditions; is always a builder.

2. Calls on staff departments—is determined to solve problems and develop best methods for meeting "bad conditions."

3. Develops new ideas and methods—not an inventive genius but has sufficient ability to develop ways and means of maintaining quality and increasing production.

The foregoing are not the only factors in the make-up of a good leader or supervisor. A yardstick for supervisors must always be modified by the ideals, standards of value and policies of the executives constituting the top management. The quality and level of top management will inevitably determine what factors are important in any list of specifications for a given job.

The point is that in the minds of the worker the foreman or supervisor symbolizes the whole company. Therefore, only thoroughly qualified men should be selected as supervisors. Capacity and ability to do the job are essential if company policies are to be carried down to the men at the face. Conversely, if it is to realize good mine supervision, management must develop the kind of company policy that will guarantee effective constructive action.

It is gratifying to note that some operating organizations are developing a more modern scientific approach to the all-important matter of supervision. One, for example, is gaining statewide recognition as a good company to work for and with. An incident two or three years ago illustrates the attitude of the top management, which, in the last analysis, has been the real force in building its high organization morale.

The production manager attended a meeting on costs at one of the mines, presided over by the superintendent. Half way through, the superintendent asked the production manager for a few remarks. In his talk, the production manager surprised the men by comparing costs when he had been superintendent and those then prevailing. He showed clearly how much better the figures were and congratulated the mine staff on its accomplishment. His frankness and sincerity won the admiration and loyalty of every man present. The fact that he was big enough to talk about his own results gave them a new faith in their production manager and helped them realize the kind and quality of supervision he wanted them to exercise in dealing with the men under them.

Gap Should Be Closed

It has been said frequently that there is too wide a gap between the front office and the men at the face. When management recognizes this fact, more top executives will find ways and means of getting closer to the vital problem of supervision.

The problems of the assistant mine foreman and other bosses should be studied more carefully. The daily performance of these supervisors should be analyzed. From this job analysis a definite training program should be set up to fit each supervisor to better discharge his responsibilities. Supervisors in the coal industry will continue to act like glorified "helpers' assistants" until top management learns how to give them the status of officials.

FIELD WELDING

Cuts Weight, Cost and Vibration In Preparation Plants, Adding Years to Life*

A. Field welding develops a tipple structure about 14 times more rigid than one held together by rivets.

B. Field welding shows a 12.6 percent saving over riveting.

C. Gross saving for the industry would total about $504,000 annually.

D. By field welding, increased service life, efficiency and general economy are attained.

By CHARLES S. ROACH

Structural Engineer
International-Stacey Corporation
Columbus, Ohio

LITTLE or no consideration has been given to field welding as a means of reducing vibration and construction cost of coal-preparation plants and tipples. In fact, industry has devoted insufficient study to such buildings. Competition in the business of building preparation plants being severe and there being a mad rush to get the job finished and operating, no time is available for a thorough and comprehensive design of such structures. Consequently, not the most economical and certainly not the most rigid of buildings have been erected for such purposes.

All coal-preparation plants are subject to much shaking and vibration. Car hauls, car dumps, cages, skips, feeders, shaking screens, vibrators, jigs, conveyors, crushers, pickbreakers, loading booms, etc., all add to the vibration of preparation plants and tipples, but it is the shaking screens that cause the greater part of the vibration. Consequently, the columns supporting the machinery must be placed so that their maximum resisting moment will oppose the twisting moment of the screens.

In almost every instance, screens are located so that they shake in a direction perpendicular to the railroad tracks and, hence, bracing which should be erected parallel to the screens cannot be placed at such a level and in such a direction as will stiffen the structure effectively and transmit the stress direct to the foundation. Fig. 1 shows how the movement, resulting from the thrusts of the shaking screens, increases at the more remote parts of the structure, being three times as great in Bent *d* as in Bent *b*. As passageways, picking tables and loading booms leave from the down-track side of the screens, no adequate bracing can be provided for Bents *b*, *c* and *d*.

Diagonal cross bracing, it is true, can be placed across the tracks in Bent *a*, but it must be everywhere above track clearance, which is 18 ft. above the rails. Hence, with partial bracing in Bent *a* and no bracing at all in Bents *b*, *c* and *d*, Bent *a* becomes a center about which Bents *b*, *c* and *d* are rotated, or "whipped," by the movement of the shaker screens.

Preparation-plant designers have found, in general, no way to lessen vibration except by making their structures heavy. Because of the interference of equipment and passageways and by reason of expense, riveted connections that would give rigidity cannot be provided. Therefore, as only standard connection angles are used for beam framing and these are flexible, vibration or movement is resisted inadequately. As the columns usually are larger than their loading requires, the connections can be made such as will convert free into fixed, or continuous, beams.

Even where backlegs can be placed to carry the stresses to the ground and thus brace the screen bay, the flexibility inherent in a riveted connection still is present. A welded unit, however, such as shown in Fig. 11, would afford a strictly rigid backleg. An attempt has been made to eliminate the vibration caused by reciprocating stresses by using the patented "Murry floating drive," also by supporting that drive on a high concrete pier, but this suppresses only one source of vibration.

With a riveted connection a beam can be regarded as having no more strength than a beam with free ends or, as it is usually termed, a "free beam." As is shown in Table I, only a small percentage of the bending strength of a beam is thus developed. Perusing these figures, it is clear that, if the bending moment of a column beam is fully developed at its connections, a structure will be obtained 100/7.25, or about fourteen times as rigid as with the standard riveted connection. At the same time, by welding, the beam is converted from a simple to a continuous, or fixed, beam, thereby increasing the uniform load it is able to carry.

If a beam is free at its two ends, its maximum moment is Wl/8. If it is held firmly at its ends, as by welding, then its maximum moment is Wl/12. Suppose the moment Wl/12 is made equal

* Adapted from a paper receiving an award in the 1940 competition held by The James F. Lincoln Arc Welding Foundation.

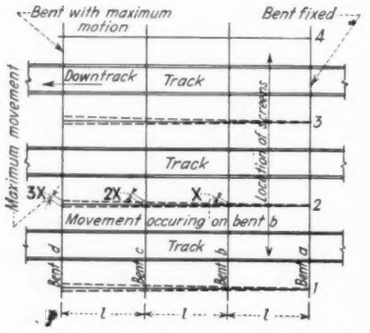


Fig. 1—Typical preparation plant plan showing how the screens "whip" the structure. As the tipple twists with Bent *a* as a center, the movement is proportional to the distance from that bent.

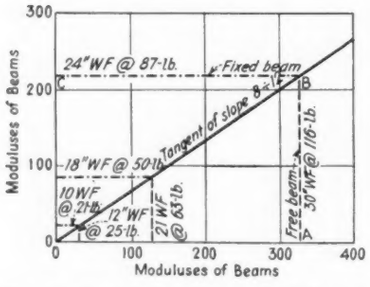


Fig. 2—By the device of plotting lines at right angles to the horizontal and vertical axes of coordinates at distances representing the moduluses of the several beams and cutting these by a line from the origin, or zero, of the coordinates, which line pitches at an inclination of 8 in 12, it is possible to show that fixed beams will give equal resistance to free beams of greater weight or size, for a free beam gives only eight-twelfths, or two-thirds, as much resistance as a fixed beam because of its manner of stressing.

to 1, then the moment Wl/8 will be equal to 12/8, which is 4/12, that is, 50 percent, more than Wl/12. This is the same as saying that with equal cross-section, the stresses, when the cross beam between bents is free, will be 50 percent more than where the cross beam is held firmly by welding, but, when the same load is imposed, a beam of lighter weight can be used with welding, thereby saving steel.

At right angles to both axes of coordinates in Fig. 2 are plotted the moduluses of beams. Those drawn normal to the horizontal axis represent the sizes and weights of *free* beams that would experience a definite maximum permissible stress in their extreme fibers and those drawn from the vertical axis represent the sizes and weights of *fixed* beams that would experience the same stress also in their extreme fibers. The modulus of the section in the case of the free beam will have to be made equal to Wl÷8S and that in the case of the fixed beam will have to be made equal to Wl÷12S. It is not by chance that all the lines drawn at right angles to the vertical axis end along the same straight line with the lines drawn at right angles to the horizontal axis, because the respective moduluses required for equal resistance in the two kinds of beam, free and fixed, must always be in the ratio of 12 to 8. Thus, looking in the lower left corner of the chart, it will be noted that a 10-in. wide-flange fixed beam running 21 lb. per linear foot will have the same resistance as a 12-in. wide-flange free beam running 25 lb. per linear foot.

A 12-in. wide-flange beam running 25 lb. per foot has a resisting moment of 46,000 ft.lb. When fixed at its ends, it has a tensional stress at *a* and *c*, Fig. 4, and a compressive stress at *b* and *d*. The simplest way to connect a cross beam to a column in the field is by setting it on a seat, shop-welded to the column, with the beam welded directly thereto. To facilitate field erection, beams customarily are ordered a trifle shorter than the distance between columns. Thus the welds at the two ends will be differently constructed; one end will abut and the other will have clearance.

In future calculations, the following safe stresses for welded construction will be used:

Tension	13,000 lb. per square inch
Compression	15,000 lb. per square inch
Shear	11,000 lb. per square inch
Tension or Compression	3,000 lb. per linear inch for a ⅜-in. fillet.
	4,000 lb. per linear inch for a ½-in. fillet.

Then at *a*, Fig. 5, where the flange is 6½ in. wide, the strength of the two fillets will be:

3,000 x 6½ = 19,500 lb.
4,000 x 6½ = 26,000 lb.

45,500 lb. x 1 ft. = 45,500 ft. lb.

which moment is about equal to a resisting moment of 46,000 ft.lb., which is that of the beam itself.

Then again in Fig. 5, as the beam abuts the column at *b*, the compression will take care of itself and all that is needed is a weld, *w*, that will keep the beam against the column. Then at *c*, Fig. 6, assuming a tensile strength for a steel plate to be 18,000 lb. per square inch:

Tension of ½-in. plate = 46,000 (½ x 18,000) = 5.1 in.
Required length of V-weld = 46,000 (½ x 13,000) = 7.1 in.
Hence a 7¼-in. plate should be used. Then 1 = length of plate = 46,000 ÷ (4,000 x 2), for there are two fillets, = 5.7 in.

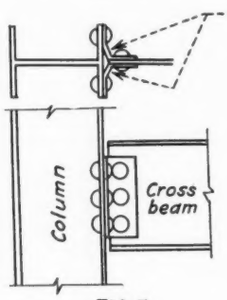


FIG. 3

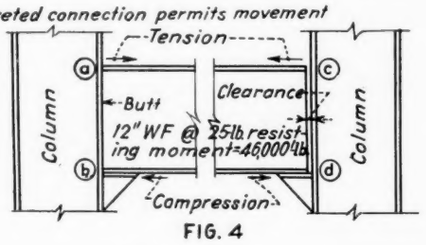


FIG. 4

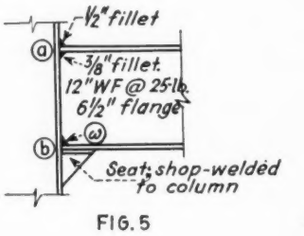


FIG. 5

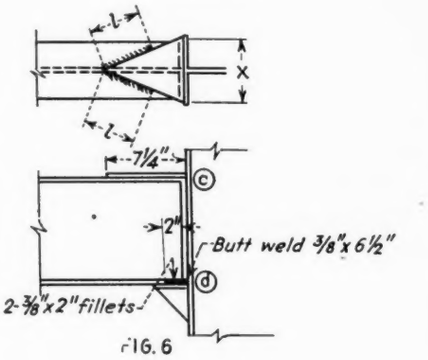


FIG. 6

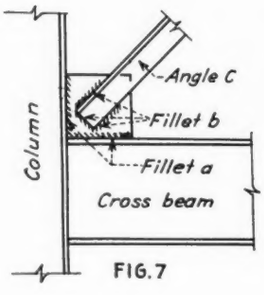


FIG. 7

Fig. 3—Flexibility of riveted connections. Fig. 4—Beam welded to two columns; shows which fibers are in tension and which in compression. Fig. 5—Method of welding tight end of beams. Fig. 6—Manner in which clearance end of beam is secured. Fig. 7—How diagonal brace is welded.

Again at *d*, Fig. 6

Butt weld = ⅜ x 15,000 x 6½ = 36,500 lb.
Two ⅜-in. fillets, each 2 in. long
= 3,000 x 2 x 2 ..... = 12,000 lb.
48,500 lb.

48,500 lb. x 1 ft. = 48,500 ft.lb., which will more than suffice.

The above conditions and calculations are all shown for beams framing onto the flanges of columns, but the stress problems of beams framing into the webs of columns similarly can be solved. Fig. 9 shows beams thus being framed. Here the weld can be placed along the toes of the beam flanges and over the top. Where the beams frame into the column flange only, stiffener plates should be used to reinforce the column flanges, as shown in Fig. 9.

Where beams are framed into the web only and none is framed onto the column flange at that point, details in Figs. 5, 6 and 9 will apply. Where beams frame onto the column flange as well as the web, the stiffener plates will serve as connection plates, as shown in Fig. 9.

Connections for beams of other sizes can be calculated by similar methods. Fig. 12 was prepared to aid in the estimation of the weight of connections for fixed beams.

Fig. 7 shows the method used in welding braces and thus avoiding a flexible riveted connection. The fillets *a* are calculated so as to resist the components of the angle *c*. The fillets *b* are calculated to resist the tensile component of the stress in that angle.

For example: Assume the brace *c* to be a 4x3x$\frac{5}{16}$-in. angle at an inclination of 30 deg. to the horizontal. The gross cross-sectional area of the angle is 2.09 sq.in. Let $\frac{5}{16}$-in. fillets be used which will have a strength in tension and compression of 2,500 lb. per linear inch. Then,

Tensile strength of brace = 2.09 x 18,000 = 37,600 lb.
Length of fillet *b* = 37,600/2,500 = 15 in.
Length of each of two horizontal fillets, *a* = (37,600 x 0.866) ÷ (2,500 x 2) = 6½ in.
Length of each of two vertical fillets, *a* = (37,600 x 0.5) ÷ (2,500 x 2) = 3¾ in.

For the average brace, 42 rivet holes will have to be punched as well as the additional angle clips not required with welded braces.

Bins for coal or refuse storage are essentially a part of the present-day preparation plant. Typical bin details are shown in Figs. 13 and 14. As riveted bins involve much layout and shop labor, field welding offers large savings.

To illustrate the advantages of this system of construction, a description of the changes that could have been made in the design of the preparation plant of the Elk Horn Coal Corporation, Wayland, Ky., may be helpful. This structure was designed by the author and built by the Fairmont Machinery Co. in 1937. A thorough study of the structure reveals large savings that could have been made had a field-welded construction been used, and the job when finished would have been much more rigid, thus reducing vibration and maintenance.

In this plant were 88 columns, fitted with two wing plates, a base plate and four connection angles. The weight of this base material was 8,164 lb. By welding, and by using a 12x¾x17-in. base plate, the weight could have been reduced to 3,820 lb., a saving of 4,340 lb.

For stiffening, 84 sets of diagonal cross bracing were used. The 336 plate and angle connections at the ends of this bracing weighed 10,080 lb. By welding an 8x¼x8-in. plate, the total weight could have been cut to 1,680 lb., a saving of 8,400 lb. without allowing any compensation for the many rivet holes that would have been eliminated by the replacement of riveted by welded construction. Had that element been considered, the size of the angles could have been reduced.

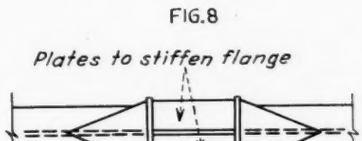


FIG.8

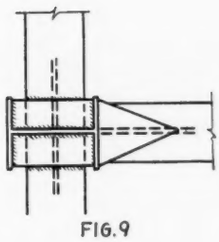


FIG.9

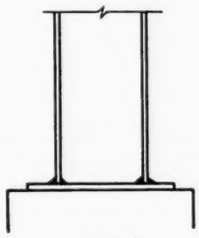


FIG.10

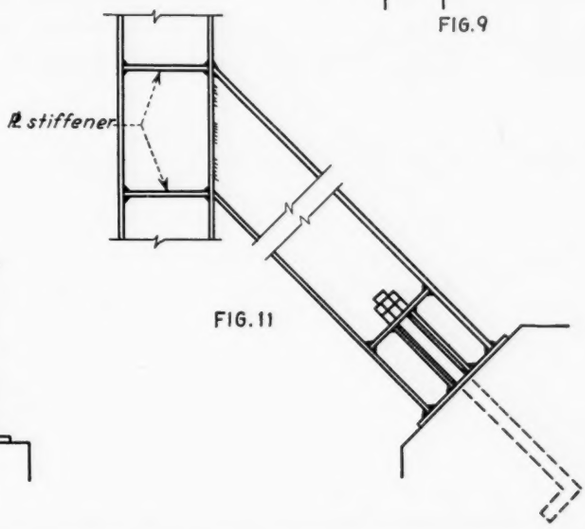


FIG.11

Fig. 8—Plan of framing to column flange. Fig. 9—Plan of framing to column web and flange. Fig. 10—Welding of column to base. Fig. 11—Welded back-leg provides maximum rigidity.

By using Fig. 1 and changing all simple beams framing into columns to fixed beams and welding, a saving in weight of 20,274 lb. could have been effected, as shown in the upper part of Table II.

All beams not framing into columns were made in the calculations of the same size as would have served had they been simple beams, but the saving in the connections due to welding is shown in the lower part of Table II to be 14,588 lb.

There are 2,120 linear feet of purlins—7-in. channels running 9.8 lb. per linear foot—and 720 linear feet of purlins—6-in. channels running 8.2 lb. per linear foot. Welding these purlins to rafters at the bottom of the channel and using a bar on the backs at the top, a 6-in. channel running 8.2 lb. per foot can be substituted for the 7-in. purlins and a 5-in. channel running 6.7 lb. per foot can be substituted for the 6-in. purlins.

Weight of present purlins—
9.8 x 2,120 = 20,800 lb.
8.2 x 720 = 5,900 lb.
26,700 lb.

Weight of welded purlins—
8.2 x 2,120 = 17,400 lb.
6.7 x 720 = 4,800 lb.
22,200 lb.

A saving of 4,500 lb.

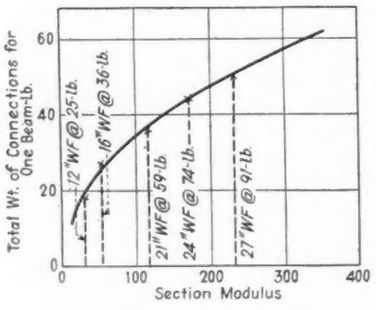


Fig. 12—Weight of connections for fixed beams of given section modulus.

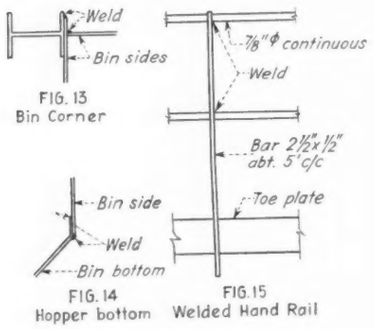


Fig. 13—Welding of bin corner. Fig. 14—How hopper bottom should be welded. Fig. 15—Welded handrails make a smart appearance.

Welded handrail as shown in Fig. 15 was used for the first time on this job. It has no sharp corners or edges and has a much better appearance. As there were 20,900 lb. of field rivets required for the tipple, that much weight could have been saved by welding. These rivets cost $941.

Weights Saved by Welding

Member	Saving Made by Welding, Lb.
Columns	4,340
Bracing	8,400
Column beams	20,274
Intermediate beams	14,588
Purline	4,500
Total structure	52,102
Field rivets	20,900
	73,002, or 36½ tons

Girts and a few small roof trusses were not considered.

The present riveted design contains 860,000 lb. of structural steel disregarding the 20,900 lb. of field rivets. Shop costs on this structural steel were 3.8443c. per pound, or a total of $33,061. Field erection costs on this steel were 2.088c. per pound, or a total of $17,957.78. Total riveted costs were: Shop, $33,061.00; field, $17,957.78; field rivets, $941.00; total, $51,959.78.

Neglecting the shop savings in layout work, the shop costs with welding will be: (860,000 lb. — 52,100 lb.) × 0.038443 = $31,058.10. Field welding has been found in past mill-building construction to save 15 percent on riveting cost, so field erection costs may be figured as (860,000−52,100) (0.02088 × 85 percent) = $14,338.61.

Total welded costs	
Shop	$31,058.10
Field	14,338.61
	$45,396.71
Riveted cost	$51,959.78
Welded cost	45,396.71
Amount saved	$6,563.07

Percentage saved $\frac{\$6,563.07}{\$51,959.78} \times 100 = 12.6$.

From the best information available (*Coal Age*) I found that in 1937 about $2,500,000 was invested in coal structures by the bituminous coal operaindustry will add about $1,500,000, or tors. To this amount the anthracite a total of $4,000,000 for the year.

The savings for the year for the entire industry therefore will be 12.6 percent of $4,000,000, or $504,000.

By reducing vibration in preparation plants and tipples, the life of equipment and structures will be lengthened, thereby efficiency and economy in construction and operation will be developed. This reflects a saving to the entire population, as, through the decreased price of coal, economy in first cost and prolonged life will accrue to domestic consumers and manufacturers.

Table I—Comparison of Resistance Moments of Standard Riveted Cross Beams With Those of the Beams Which Are Fixed to the Columns by Welding

(Standard Series A angles used for connections)

Size and Weight of Cross Beam	Resistance Moment of Beam Foot-pounds	Resistance Moment of Standard Riveted Connection 3/4-In. Rivets — Foot-pounds	Percentage of Rigidity Developed
8-in. Wide Flange at 17 lb. per ft.	21,000	2,800	13.3
10-in. Wide Flange at 23 lb. per ft.	36,000	2,800	7.8
12-in. Wide Flange at 28 lb. per ft.	53,000	2,800	5.3
14-in. Wide Flange at 30 lb. per ft.	63,000	3,500	6.6
16-in. Wide Flange at 36 lb. per ft.	84,000	5,900	7.0
18-in. Wide Flange at 50 lb. per ft.	134,000	7,000	5.2
21-in. Wide Flange at 63 lb. per ft.	192,000	12,200	6.3
24-in. Wide Flange at 80 lb. per ft.	279,000	19,600	7.0
27-in. Wide Flange at 98 lb. per ft.	383,000	26,200	6.8
30-in. Wide Flange at 116 lb. per ft.	492,000	35,700	7.2
		Average	7.25

Table II—Savings That Might Have Been Effected by Substituting Field Welding for Riveting at Elk Horn Coal Corporation's Preparation Plant

Column Beams

Members in Constructed Plan — No.	Size	Length, Feet	Weight, Pounds	Weight, Riveted Connection, Pounds	Equivalent Fixed Beam	Weight, Pounds	Weight, Welded Connection, Pounds
63	8-in. w.f. @ 17	950	16,190	1,890	8-in. w.f. @ 17	16,100	755
9	8-in. w.f. @ 24	144	3,450	270	8-in. w.f. @ 17	3,450	108
61	10-in. w.f. @ 21	1,020	21,400	1,830	8-in. w.f. @ 17	17,300	732
16	12-in. w.f. @ 25	260	6,500	512	10-in. w.f. @ 21	5,450	204
13	12-in. w.f. @ 28	245	6,900	416	10-in. w.f. @ 23	5,650	182
2	12-in. w.f. @ 40	42	1,680	84	12-in. w.f. @ 28	1,180	214
1	12-in. w.f. @ 53	24	1,280	32	12-in. w.f. @ 36	865	18
8	14-in. w.f. @ 30	155	4,500	256	12-in. w.f. @ 25	3,880	144
2	14-in. w.f. @ 33	33	1,090	64	12-in. w.f. @ 28	925	36
3	14-in. w.f. @ 43	44	1,890	96	14-in. w.f. @ 30	1,320	63
8	16-in. w.f. @ 36	124	4,460	336	14-in. w.f. @ 30	3,720	168
1	18-in. w.f. @ 47	18	850	42	16-in. w.f. @ 36	650	27
2	18-in. w.f. @ 50	30	1,500	60	16-in. w.f. @ 40	1,200	54
1	18-in. w.f. @ 64	24	1,530	42	16-in. w.f. @ 40	960	27
1	21-in. w.f. @ 59	18	1,060	62	18-in. w.f. @ 47	850	31
1	21-in. w.f. @ 63	15	950	62	18-in. w.f. @ 50	750	31
1	24-in. w.f. @ 80	24	1,920	74	21-in. w.f. @ 63	1,510	36
1	30-in. w.f. @ 108	24	2,600	100	24-in. w.f. @ 87	2,080	44
			79,660	6,228		62,840	2,774
Connections			6,228			2,774	
Total			85,888 (riveted steel)			65,614 (welded steel)	

Saving in weight: riveted steel − welded steel = 85,888 lb. − 65,614 lb. = 20,274 lb.

Intermediate Beams

No.	Size, Inches	Weight Standard Connection, Pounds	Weight Welded Connection, Pounds	Difference, Pounds
375	8	11,250	375 x 10 = 3,750	7,500
142	10	4,260	142 x 10 = 1,420	2,840
79	12	2,370	79 x 10 = 790	1,580
19	14	608	19 x 12 = 228	380
54	16	2,276	54 x 14 = 756	1,520
17	18	714	17 x 20 = 340	374
4	21	248	4 x 25 = 100	148
1	30	100	1 x 30 = 30	70
2	36	248	2 x 36 = 72	176
Total				14,588

CAN REBUILDING

Make Old Locomotives Efficient And Save Money for the Mine Operator?

By ERNEST PRUDENT
Chief Electrician, Zeigler No. 1 Mine
Bell & Zoller Coal & Mining Co.

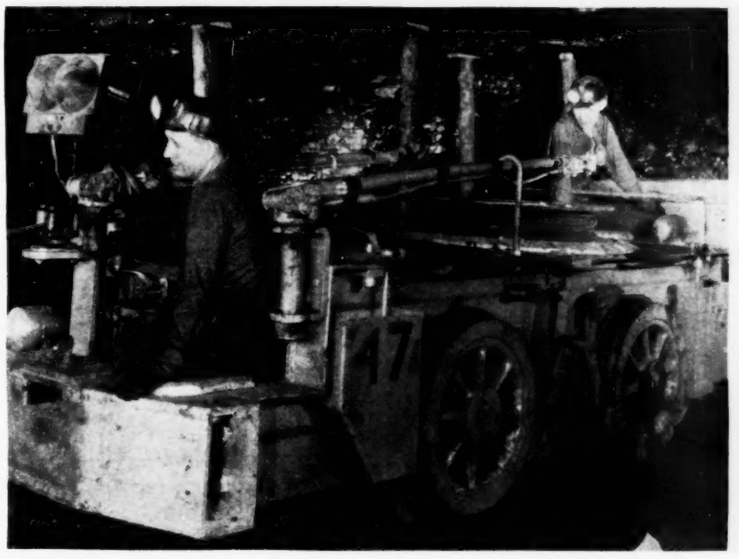
OLD EQUIPMENT for mine haulage often is considered obsolete and consequently costly and inefficient. In some cases such an opinion may be correct. But only by knowing performance and cost can one determine if it is, and to what extent. Some of our haulage equipment, purchased 34 years ago and rebuilt ten years ago, might be classed as obsolete on the basis of age, but according to performance and cost records these rebuilt locomotives have saved my company approximately $45,650.

One of eleven 6-ton gathering locomotives of one type used in Zeigler No. 1 mine is shown in the accompany illustration. These locomotives were built in 1907 and the original side frames and bumpers were made of cast iron. During the many years of service the frames were broken and patched many times with plates and rivets. Finally, when more patching was out of the question, new frames, bumpers and sand boxes were made at the mine by welding. These all-welded frames now are ten years old and inspection reveals no cracks or breaks. Today, these locomotives are competing with machines built in 1935 and 1936 at a cost of $6,800 each. The records show that time lost during operating periods and maintenance cost are in line with those of present-day locomotives.

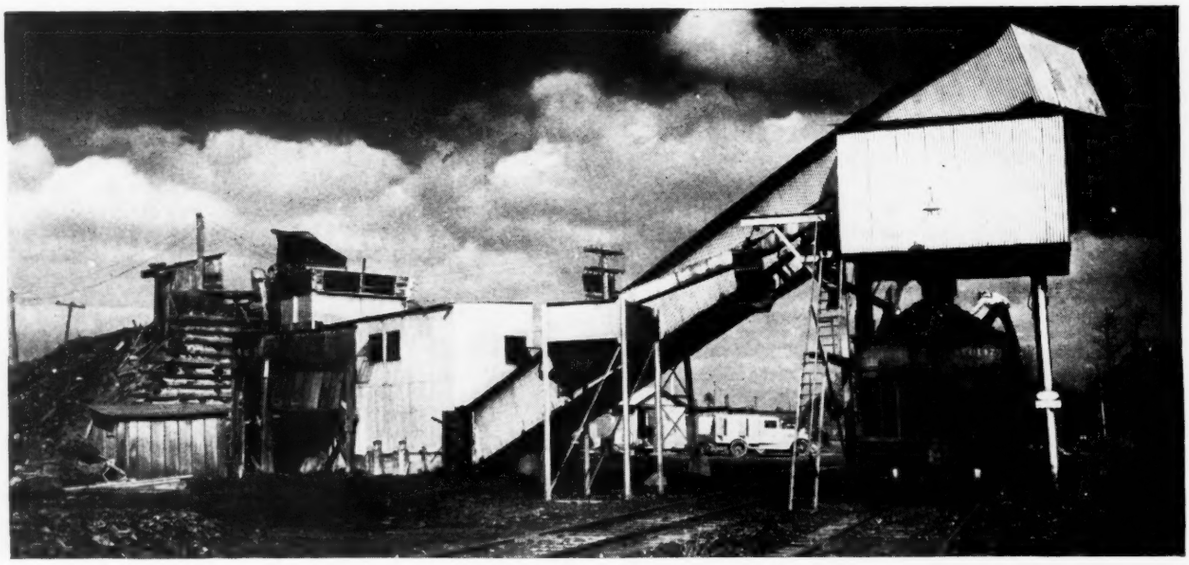
Total cost of the labor and material used in rebuilding averaged $900 per locomotive, including rewiring of the motors and installation of new controllers, new-type headlights and other minor improvements. The side frames are 1-in. plates 30 in. wide and 11 ft. long reinforced on top by 7/8-in. 6x6 angles. The bumpers are 12-in. ship channels 48 in. long, with 1x12x48-in. plates, and are all welded. The sand boxes are 1/4-in. plate cut to shape and welded. These locomotives have been in continuous service since they were rebuilt ten years ago.

Let us examine some facts and figures. First, I would like to say that these rebuilt machines have served our purpose as well as new-type units in so far as actual operating efficiency is concerned. Cost of maintaining these rebuilt locomotives, however, is somewhat higher than for locomotives of a later design. Consequently, the average annual cost of maintaining a rebuilt locomotive is $700, against $525 for a newer type.

Had we not rebuilt these eleven locomotives my company would have had to invest $74,800 in new equipment. Total maintenance cost on these eleven new locomotives over ten years ($525 per locomotive per year) would have been $57,750, making the total cost to the company, including the original investment, $132,550. We completely rebuilt eleven locomotives at a cost of $9,900. Ten years' maintenance on these locomotives at $700 per year adds up to $77,000. This, with the cost of rebuilding, makes a total of $86,900, or 70 per cent of the cost of buying and maintaining new equipment, if it had been done, over a similar period. Thus, the saving to the company was approximately $45,650, in addition to the fact that the rebuilt locomotives were equally efficient from the operating standpoint.



This locomotive, rebuilt ten years ago to operate as efficiently as a new machine, is one of eleven on which rebuilding resulted in a substantial saving.



Elba preparation plant. Left is the picking and crushing section; right, the screening and loading section.

36 INCHES OF COAL

Under 40 to 45 Ft. of Cover

Mined With ¾- to 2-Cu.Yd. Shovels at Elba

By IVAN A. GIVEN
Associate Editor, Coal Age

REMOVING up to 40 to 45 ft. of overburden to recover an average of 36 in. of Lower Kittanning coal, the Elba Coal Co., Inc., Corsica, Pa., operating five shovels carrying ¾- to 2-cu.yd. dippers, has a producing capacity of 1,500 tons or more per day. Sidehill work is the rule and the equipment usually is divided between two or more pits, one or more normally in full production and another developing or starting in production. Thus, at least a thousand tons of daily output is available at all times, with the maximum as 1,500 tons or more.

Acreage per setting varies from 3 to 15 in most cases, while the haul to the tipple ranges from 1 to 7 miles. Hauling is contracted, the contractors using standard end-dump trucks. These dump into a 25-ton hopper at the tipple, recently redesigned to permit crushing and screening and loading on two tracks. From the hopper the coal is fed onto a shaking picking table for cleaning. Screen sections near the lower end unload the fines onto a belt feeding the screening and loading plant, while the coarse coal goes off the end of the table either onto the same belt or into an adjustable single-roll Jeffrey crusher and then onto the belt.

If no crushing is being done, the picked mine-run may be loaded as such or routed to a Simplicity vibrating screen making lump (loaded on one track) and nut-and-slack (loaded on the second track). If the crusher is being operated, the coal, with the top size determined by the roll setting, also may be loaded directly. Or it may be run to the vibrator plant to make egg and nut-and-slack and for additional hand picking. Since its inception, the entire output of the organization has been marketed by the Cleveland-Cliffs Iron Co., Cleveland, Ohio.

The Elba operations are in eastern Clarion County, where the Lower Kittanning outcrops on the sides of most of the low, gently sloping hills, thus providing an opportunity for stripping back three to four or more cuts before overburden thickness becomes excessive. Occasionally, the seam is found at the foot of a hill where the slope tapers off or is present out into or entirely across a valley, in which cases relatively large areas may be worked before too thick overburden is encountered. Such conditions are the exception, however,

and consequently most of the stripping is of the sidehill type.

Although the average is 36 in., seam thickness in the various Elba pits has dropped to as low as 18 in. and risen to as much as 6 ft. Normally, the coal includes a ½- to 2-in. binder, which is picked out in the tipple, although some is removed during loading operations in the pits. Directly over the seam is a thin slate, most of which is taken off by the stripping shovels. The remainder is bulldozed off and final cleaning is done by hand shoveling and sweeping.

Shale is the principal hard material in the overburden, although thick, hard sandstone has been encountered in some pits. Where only shale is present, the overburden is dug without shooting. When shooting is required, the drilling is contracted. Sidewall equipment is used where possible because of the lower footage charge. On occasions, however, when it was necessary to break up hard strata high up in the bank, vertical drilling, bringing the powder charge higher up in the rock, is employed.

Two Shovels at First

The Elba organization began operations in 1938 with two Manitowoc "Speedshovels." In addition to Dr. H. D. Smith, president, the staff includes C. H. Stinard, superintendent; Myles Anderson, master mechanic; Wayne Dinger, assistant; and George Winters, tipple foreman. Present shovel equipment is as follows: Model 3500 "Speedshovel" with 45-ft. boom, 34-ft. sticks and 2-cu.yd. Pettibone-Mulliken dipper; two Model 3000 "Speedshovels" with 37-ft. booms, 28-ft. sticks and 1¾-cu.yd. P-B dippers (all three equipped with Caterpillar D17000 diesel engines); one Osgood with 35-ft. boom, 22-ft. sticks and 2-cu.yd. "Amsco" dipper; and one Bucyrus-Erie 19-B with ¾-cu.yd. dipper. The 2-cu.yd. machines usually do nothing but strip, while the others, as conditions may warrant, are used for either stripping or loading. Auxiliary equipment includes one International TD-40 diesel tractor with Bucyrus-Erie bulldozer; one "Cletrac" diesel tractor with Wood bulldozer; and two Jaeger gasoline pumps, one a 2-in. unit driven by a single-cylinder engine and the other a 4-in. suction 3-in. discharge machine with 4-cylinder Hercules engine.

The Model 3500 "Speedshovel" can handle 1,700 to 2,100 cu.yd. of overburden in 24 hours in ordinary digging. It also is able to strip to 40 or 45 ft., making a cut 30 to 35 ft.

Opening up a new pit with three shovels working in tandem.

Here the biggest Elba shovel digs in to start a new cut while loading goes on in the background.

Loading in an Elba pit. This shovel also strips when not loading.

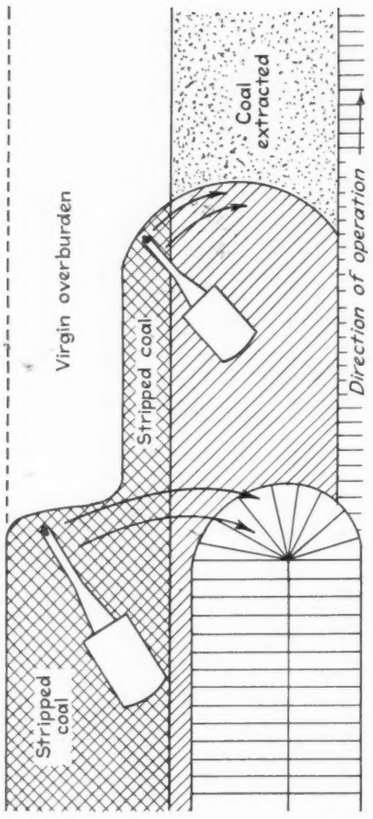


Fig. 1—Showing diagrammatically how two shovels frequently work together in stripping at Elba.

wide and casting across a 12-ft. coal berm. The Model 3500 and one Model 3000 together, with the 3000 loading one shift and stripping the rest of the time, are able to produce 1,000 tons per day under normal coal and overburden conditions. Stripping was carried to 60 ft. in one instance where the coal thickened to 6 ft. In this case the Model 3000 machine was operated on a bench on the spoil bank, relaying dirt cast up to it by the Model 3500 unit. Two machines frequently work together in normal overburden also, as will be detailed below.

The first cut usually is made 50 ft. wide in starting into a new pit, and as many as three shovels may work together on this job. Width of the succeeding cuts usually is limited to 30 to 35 ft. With the 12-ft. coal berm usually left for haulage, particularly in winter, when conditions get bad, pit width thus is about 42 to 47 ft. Limiting second and succeeding cuts to 30 to 35 ft. is done to prevent spreading out the spoil rows and thus sacrificing dumping space.

Although the 2-cu.yd. shovels, as well as the 1¾-cu.yd. units, may operate alone in stripping, it is quite common practice at Elba to combine two, as shown diagrammatically in Fig. 1. Under this system, the smaller works from a fill in the old pit, which it builds ahead as it moves along by sidecutting and casting out front. The larger machine follows on the coal and finishes the cut, casting against the old spoil on the fill made by the small shovel. This has proved a most convenient method, under Elba conditions, of speeding up stripping and handling spoil, especially in thicker overburden.

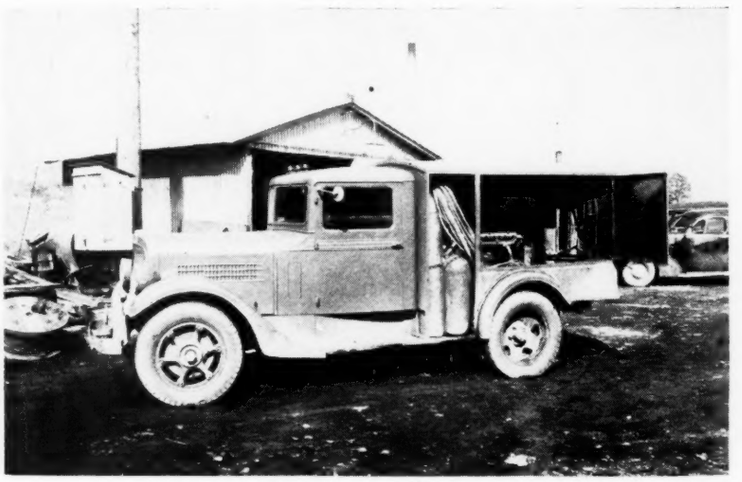
Regular inspection and preventive maintenance have materially reduced shovel upkeep. The only major repair job on any of the three "Speedshovels" was rebuilding the caterpillar frames on the Model 3500 machine, which started operating in June, 1938. Frames on this machine are built up of shapes and plates, and as a result of dropping and pounding in sandstone and other hard rock developed a major break in July of 1941. Rebuilding and strengthening required 15 days.

Hoisting ropes usually give two months of service unless thrown off the point sheaves by trees or limbs in stripping. Dipper teeth are repointed with a cast shape furnished by "Amsco" especially for that purpose. When worn, the old point is cut off and the new point, cut from the "Amsco" bar, is tacked on with stainless rod. Attachment is finished with manganese rod, and finally a bead of hard surfacing is run entirely around both sides of the tooth, including the new point.

Shovels normally are inspected at least once a day by the master mechanic or his assistant. This inspection, plus the operators' observations, reveal any condition which should be corrected. Practically all repairing is done in the pit, including the job on the caterpillar frames noted above. Only very small parts or small equipment, such as the pumps, are brought to the shop at the tipple to be operated on.

Repair work has been materially facilitated by a special welding and repair truck developed at the mine (see accompanying illustration). With a Stewart chassis as the starting point, the truck is made up with a 400-amp. General Electric arc-welding generator driven by a Ford V-8 engine, supplemented by oxyacetylene cutting and welding equipment with the tanks in a compartment just behind the cab. Some 300 to 400 lb. of welding rods and electrodes are carried at all times, including every type likely to be needed in any job that might come up.

The welding generator originally was mounted on a trailer and pulled by a car, but was too heavy to be handled in such fashion. Besides, oxygen and acetylene tanks had to be taken to the job separately, and other tools and apparatus had to be assembled from various points. To save time and insure everything being on hand, construction of the truck was started in the fall of 1940. It includes special compartments for tools, bolts, chain blocks, jacks, electric drills, trouble lights, small parts and anything else that might be needed on a repair job.



This Elba welding and repair truck is designed to handle on the ground any job which might come up.

STORING COST CUT

At Cannelton Coal & Coke Co.

By Tractor-Grader Stocking and Reclaiming

NEW equipment, including a diesel tractor with bullgrader, for stockpiling and reloading at the Cannelton Coal & Coke Co. operation, Cannelton, W. Va., has lowered cost compared to the former handling with a locomotive crane, doubled the capacity per unit of ground space and reduced heating and consequent fire risk. The tractor-grader works in conjunction with three other portable units: a feeder conveyor, a ground conveyor and a stacking conveyor.

On ground between railroad tracks and adjacent to the tipple, 65,000 tons of 1x0-in. and 2x0-in. coal is stored during slack seasons. Piling is now carried to a height of 40 to 45 ft. Unloading—that is, stocking—uses all four units. The portable feeder conveyor is wheeled into one of the several pits under the railroad track. This discharges to the ground conveyor, which in turn empties to the stacker. The tractor-grader pushes the coal to the desired position, levels it and packs it down in 3-ft. layers.

In reclaiming and reloading, done at a rate of 1,200 to 1,600 tons per 8-hour day, the portable ground conveyor is not used. In this operation the tractor-grader bulldozes the coal to the portable feeder conveyor, which is positioned at the toe of the pile. The stacker elevates and delivers directly from feeder to railroad car.

The bulldozing power unit is an International TD-18 TracTractor rated 70 drawbar-horsepower, the largest made by the company. Its "Bullgrader" attachment was made by the Bucyrus-Erie Co. Fuel consumption is approximately 3 gal. per hour. Conveyor units were made by Barber-Greene. The ground conveyor is 45 ft. long; the stacking conveyor, 60 ft.

The company operates three mines in the vicinity of Cannelton, Kanawha County, these in the Eagle, No. 2 Gas and No. 5 Block seams. The same interests and management operate two other mines—at Superior, in McDowell County (Lake Superior Coal Co.), in the Pocahontas No. 3 and No. 4 seams.

This Pocahontas coal also is stockpiled and the same 3-ft. layering and packing practice is followed. Prior to the change and with a pile only 20 to 25 ft. high, temperatures reached 150 deg. F. and in some instances the coal had to be moved to prevent loss by fire. Temperatures registered in winter in the 40- to 45-ft. layered and rolled pile were only 42 to 60 deg. F.

At Superior the compacting equipment consists of a roller pulled by a smaller International tractor, both used at Cannelton until they were displaced by the new large tractor and its "Bullgrader."

F. O. Harris, of Cannelton, is vice-president and general manager of both companies, his duties also including heading of sales and purchasing. Ben Davis and B. C. Hylton are general superintendents for the Cannelton and Superior mines, respectively.

Tractor bulldozing the coal down to the portable feeder. The feeder is moved to a pit under the railroad track when coal is being stored.

Keeping the feeder working to capacity in reloading coal into cars. Some 1,200 to 1,600 tons can be reloaded in this way in an eight-hour day.

FOREMEN'S QUESTION FORUM

Save Power by Surveying Mine With Altimeter Using Data for Air-Pressure Profile*

By E. P. JAGGARD
Mining, Mechanical and Electrical Engineer
C. A. Hughes & Co., Cresson, Pa.

TO FIND where the steeper pressure drops occur in the ventilating current—that is, the lengths of airway which are most badly congested—and to ascertain what is the increased cost of power arising from this congestion is the purpose of altimeter surveys.

If, when a new mine were opened, ample airways were provided, a small difference in gage would suffice to circulate a large volume of air, but conditions at mines are never fixed and, after a time, the increased distance which the air has to travel and the increased resistance to its progress per unit of distance will decrease the volume of air passing through the workings. If more air is required, the fan has to be speeded; but it should be noted that in any airway or mine the pressure will vary as the square of the volume, and, what is more unfortunate, the power will vary as the cube of the volume, as power is obtained by multiplying volume by pressure.

Thus, to double the air volume, it will be necessary to quadruple the pressure and multiply the power eight times. Hence, it is desirable to shorten the air travel by making other openings to the surface, an easy solution where new openings do not cost too much. If, however, all the workings are to the dip and, in consequence, the cover becomes continuously greater, the cost of making other openings must be weighed against the increased cost for power.

Altimeter Like Voltmeter—A fan may be compared to an electric generator, the airways to the electrical conductors, and the pressure produced by the fan to the voltage of the generator. The latter will not produce its rated current unless conductors of low enough resistance connect the terminals. Neither will a fan produce its rated volume unless the airways which it travels have a sufficiently low resistance. In an electrical circuit with only line resistance, the total drop in voltage along the conductor is equal to the generated voltage and is proportional to the current flowing. This line drop between any two points may be measured with a voltmeter or it may be obtained accurately by computation, for the resistance for any wire size can be found in a handbook.

With air, the total pressure drop along an airway is equal to the pressure produced by the fan, but it is proportional to the square of the velocity and cannot be easily or accurately computed. The familiar formula $p = ksv^2 \div a$ expresses the relation, but k may vary between wide limits, s and a are difficult to measure with accuracy, and the v itself is not constant over any great distance.

It is for this reason that it is desirable to use the altimeter because with this instrument the pressure at any point at which we have the elevation can be read directly. The altimeter itself is essentially an unusually sensitive barometer, graduated to read in feet of elevation rather than in inches of mercury. It is a precise instrument and is capable of registering differences in elevation as small as 2 ft. or about 0.03 in. of water gage.

Use Another Altimeter to Watch Atmospheric Changes—To make an accurate survey, two altimeters are required, because the atmospheric pressure may vary considerably during any period over which readings are taken. Both altimeters are set at some known outside elevation, properly tied by a survey to the levels in the mine workings. The elevations of any other outside points are then easily determined by keeping one instrument at the known elevation and noting any difference when the other is read.

When starting a ventilation survey both instruments are taken to a point outside the mine at a known height above sea level, and there set to show that elevation on the dial. One is kept at this location and read at 15-minute intervals. In several hours its readings may vary as much as 100 ft., and to permit of easy interpolation for any given time they may be plotted on cross-section paper. The other instrument is taken into the mine and read at points along both intake and return airways as close together as practicable, always, however, at points the elevation of which has been determined. Notes are kept of station reading, time and elevation. Velocity of air and cross-sectional area of airway also should be noted. Sufficient time should be allowed at each place so as to get a normal reading rather than one affected by moving trips.

Though the entire ventilation system should be covered by the survey, it usually is not necessary to take readings as close together on the smaller splits as on the larger ones because most of the great pressure drops will occur where the greater volume of air is traveling. Readings need not be taken in any particular order nor need they follow continuously any airway. Wherever possible, the water gage should be read between adjacent points on intake and return wherever altimeter readings have been taken, although readings taken on both sides of all fans may be used. This is desirable in converting feet of air to inches of water gage.

Calculating Readings—In working up the data thus gathered, first the difference in the outside readings is deducted from or added to the inside readings for the same instant. An addition also should be made for velocity head, if the velocity exceeds 1,000 f.p.m. This correction, which equals 4.3 ft. at 1,000 ft. per minute, is equal to $v^2 \div 2g$ where v is in feet per *second* and g is the acceleration of gravity at sea level, or 32.2 ft. per second in one second. Then the difference between the corrected reading and the elevation at that particular point is the pressure in feet of air that is produced by the fan at that point or the difference between atmospheric pressure and mine pressure.

This may be converted into inches of water by dividing by the height of a column of air which would weigh the same as one inch of water of the same cross-section. This figure is easily obtained by comparing the difference in altimeter readings with water-gage readings wherever these may have been taken. Usually 66 to 70 ft. of air will be the equivalent of one inch of water, depending on the weight of a cubic foot of air. The main reason for doing this is that usually mine-air pressures are expressed in terms of water gage.

A Profile of Air Pressure—These corrected differences then, converted to inches of water, may be plotted against distance traveled, and then something that might be called "a profile of air pressure" will be obtained. Where the line is comparatively flat, conditions are good, and where it is steep, there is definite congestion.

In analyzing the results as shown on this chart, consideration must be given to the volume of air at each section. It generally will be found that the greatest pressure drops occur along main airways carrying the largest volume and that the pressure drops along smaller splits are comparatively insignificant. Carrying this thought to its conclusion, if no air were traveling, there would be no drop.

In this connection it should be noted that if the large losses in pressure occur in main airways, it is in these sections, probably within 5,000 ft. of the outside, that the greater part of the power is used, because,

* Abstract of article read at the Thomas S. Lowther Mining Institute meeting, Nov. 22, Indiana, Pa.

as previously stated, power is proportional to the product of pressure and volume, or, in other words, pressure and velocity.

Other interesting facts may be discovered; for instance, heavy power losses due to the regulation of splits. Suppose it were necessary to regulate two splits of 20,000 cu.ft. per minute in order to supply 10,000 cu.ft. per minute to another split, this chart would lead to the obvious solution.

Several such altimeter surveys have been made of No. 2 mine of C. A. Hughes & Co. which have been well worth while. This is a mine in the deep *B* or Lower Kittanning seam which at the working faces has from 750 to 1,000 ft. of cover. These surveys showed definitely where resistance had to be reduced and thus prevented work being done at points where comparatively little loss was incurred. They showed what could be expected under other plans of ventilation and thus led to several helpful changes, the full value of which are yet to be realized with the completion of other connections.

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Though Electrical Current Losses Are Small Its Voltage Losses Are Heavy

ALMOST from the day when dynamic electricity was discovered, electrical engineers have compared that phenomenon to a liquid, from which it is known to differ, however, in its invisibility, its absence of weight, its speed of travel and the fact that it is merely an impulse that moves and not a material. When water flows along a pipe, its motion is termed a "current"; the movement may be caused by the force of a pump or of gravity, and that force is termed "pressure" and the force delaying its movement is known as "resistance." In a similar manner, dynamic electricity is termed "a current of electricity"; the passage of electricity is said to be due to "electrical pressure" or "electromotive force" and the force delaying its motion is termed "resistance," just as if electricity actually was a gas or a liquid.

If we have a system of piping so tight that water cannot leak from it, and that has no branch pipe or pipes leading from it, the quantity, or current, of water entering per second at one end will be of equal volume per second with the quantity, or current, leaving at the other end, no matter how big or how small the pipe at either end may be. Similarly, if we have a current of electricity traveling in a wire and if the electricity does not leak or is not diverted to another connecting wire, the quantity of current that leaves the far end of the wire is the same as the quantity entering it. Any resistance that it suffers along the way does not lessen the current. Resistance will lower the pressure of water in a pipe as that water travels from intake to discharge, and similarly resistance will reduce the electrical pressure in a wire—that is, the voltage—but the current will not be reduced in either instance unless there is a leak.

Resistance may reduce the quantity, or intensity, of the current that can enter the conductor, but, once the current has so entered that wire or cable, it will continue on its way unchanged in quantity to the end, barring leaks. Thus the amperage of the current is the same throughout the length of the conductor, though the voltage or electrical pressure will keep dropping all along the line.

However, there is some leakage with an electric current, but, in any properly operated mine, the loss in the trolley and other conductors should not exceed 1 or 2 per cent. Some small quantity is likely to be lost at every point at which the conductor is suspended, but so little that the total loss is almost negligible. Dust on porcelain hangers, especially gypsum, which gets moist, yet is used sometimes for rock-dusting, may increase such leakage. The return current in a mine leaks quite extensively; by no means all the current goes back by the rails and bonds, if that is the appointed way by which such current is to be returned, but one need not care about such leakage, and it has not been figured in making the foregoing statement to the effect that the loss of current should not exceed 1 or 2 per cent.

It is just as well to let the return current use the ground for one of the conductors as far as it can be induced to do so, so as to use all the current-carrying capacity available. However, the main return must be through rails and bonds, and the ground must not be required to carry so much of the current that too much voltage will be needed at the return end of the cutting, loading or drilling machine to force that current through the ground. Nor should the voltage of the return be so high that the return current will spark at the rails and ignite methane, destroy pipes by electrolysis or prematurely fire shots.

Restating the aforementioned conclusion, as far as the effectiveness of the current in driving the equipment is concerned, the only current loss that needs to be considered is that between generating unit and equipment. Current loss to the ground on the return will be an asset as far as conservation of power is concerned.

Electric current in a wire and a water current in a pipe usually have quite different kinds of losses from those of an air current in a mine. The air current may lose 60 per cent of its air by leakage and ultimately will lose almost all its pressure because it is allowed to travel as fast as it will, and it travels just so fast that it builds up a resistance equal to the pressure, so that, when it leaves the mine at the end of its journey, no pressure is left. The water in the pipe also loses all its pressure in the same way, but usually the pipe delivers all or most of its water. With electricity, the leakage is small as with water in a pipe, and the loss of pressure between generator and machine has to be kept down so as to provide voltage or electric pressure at the machine.

The machine will never be able to take advantage of all the voltage, for the electricity has to go back to the generator, and the voltage on the return end of the machine will always have to be high enough to provide for this travel. That is why the rails have to be bonded and cross bonded. Only thus can the loss of pressure be made as small as possible and leave plenty of pressure drop for the machine.

Solids, Liquids and Gases Used To Fight Mine Fires

Mines fires may be fought either by direct or indirect methods. The first method endeavors to extinguish the fire by throwing rockdust, water, carbon dioxide or carbon tetrachloride on it. Rock dust is preferable if the point can be approached sufficiently close for its application. It effectually covers the burning material with a blanket of dust and causes it to smother. Water, by decomposing into hydrogen and oxygen, creates an extremely explosive gas—hydrogen—with a wide range of explosibility.

With both rock dust and water, carbon monoxide, which is mildly explosive, is likely to be formed by incomplete combustion. Its toxic quality will not be dangerous if the air current is sweeping the products of combustion away from the fire fighters and all other men are out of the mine, but hydrogen is dangerous because if it should come in contact with purer air and flame it might explode, though this is not likely. The air probably would be so impure that the hydrogen at best would only burn.

Carbon dioxide can be delivered from a soda-acid extinguisher in a steady stream. Carbon tetrachloride is dangerous, as it forms that extremely poisonous gas, phosgene, used in the World War for gassing the enemy. It has been used on fires in crosscuts that were only partly constructed or were closed by stoppings. Such use cannot be too strongly condemned. It probably could be used without danger on a fire where the air would pass off to the return. If no men were in the heading beyond the fire or in the return, this phosgene would be dangerous only to the guard or attendant in the fan house or others nearby. No evidence shows that the quantity of phosgene formed is such as to do damage to men where it has mixed with the full ventilating current in the return at the fan, which usually is many times as large as that of any single split.

With all these gases and with methane there is danger if heavy fall or an explosion should reverse the direction of ventilation or close off airways and either burn or asphyxiate the fire fighters.

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With Decreased Water Gage Methane Increases

A correspondent asks: "If the air in a heading has 3 percent of methane and the fan has a 2½-in. water gage, how much methane will the air contain if the fan is slowed so as to register only a 1-in. water gage?"

Pressure is reduced from 2½-in. water gage to 1 in., or to $1 \div 2\frac{1}{2}$ of its former value$=2 \div 5$, or 0.4. Where the cross-sectional area, the length of the course that the air travels, the perimeter and the roughness of the heading are unchanged, the square of the velocity will vary roughly as the pressure, or $v^2 \div V^2 = 0.4$, where v is the new velocity and V is the original velocity, so $v^2 = 0.4V^2$ and $v = 0.63246V$.

Quantity of air passing is proportional to the velocity, so $q = 0.63246Q$, where q= the new quantity and Q=the original quantity. With 3 percent of methane in the original quantity of air, $3 \div 0.63246$ percent, or 4.74 percent, will be present in the smaller quantity of air.

QUESTIONS ASKED BY STATE BOARDS

Examination for Coal-Mine Officials State of Colorado*

Q.—In a gassy mine, is it proof of good ventilation when a rapid-velocity current of air is passing through a small airway? Why?

A.—The rapidity of the current proves that the heading itself is adequately ventilated, but the side openings (rooms or modified longwall) may not be properly supplied with air. As the airway is small, the quantity of air may be unequal to the task of providing enough air for workings beyond, even though the velocity is high. Sufficiency of air can be determined only by measuring the air at the points the ventilation is serving. Distribution of air is as important as quantity and certainly more desirable than mere speed of current.

Q.—If the circulation of air in a mine is insufficient, how may it be increased without increasing the power required to drive the fan?

A.—Quantity of air may be increased without increasing the load on the fan: (1) by shortening the distance the air has to travel by providing new airways or shafts or by discharging the air after it has passed once through the mine in a single direction instead of carrying it back almost to the point where it entered; (2) by enlarging the airways; (3) by smoothing them with gunite and by the removal of timber; (4) by increasing the number of airways, using rooms as airways perhaps for that purpose; (5) by splitting the air; (6) by taking care not to have one or more excessively long splits that will make it necessary to place regulators on the other splits to prevent them from getting too large a proportion of the air provided; (7) by cleaning up falls or breaking up upstanding and loosely piled rocks so as to smooth the air passages; (8) by eliminating air-current bottlenecks such as occur where cars stand or pass one another; (9) by using the return as an additional intake with single-direction air flow.

Q.—The water gage reading in a mine is 3.2 in. What is the ventilating pressure in pounds per square foot? Formula: WG × 5.2 = p.

A.—3.2 × 5.2 = 16.64 lb. per square foot.

Q.—Given the same conditions as in the previous question, what is the total pressure of the air on a stopping which is 7 ft. high and 9 ft. wide?

A.—16.64 × 7 × 9 = 1048.32 lb.

Q.—A roadway is 9 ft. wide at the bottom and 8 ft. wide at the top and it is 7 ft. high. The velocity of the air current is 530 ft. per minute. What quantity of air is passing through this roadway per minute? Formula: a × v = q.

A.—Average width of heading = (width at bottom + width at top) ÷ 2 = 9 + 8) ÷ 2 = 8½ ft. Cross-sectional area of airway is 8.5 × 7 = 59.5. The velocity of the air current being 530 ft. per minute, every minute a slug of air 530 ft. long and of 55.25 sq.ft. cross section will pass through the airway, or 31,535.0 cu.ft. of air. Quantity of air passing, therefore, equals about 31,500 cu.ft. per minute.

Air Speed at Line Brattice

Q.—A roadway is 6 ft. high and 13 ft. wide. It has a line brattice made of boards throughout its length, which brattice is 3 ft. from one side of the airway. What is the velocity on each side of the brattice, if the quantity circulating is 9,000 cu.ft. per minute? Formula: $v = q \div a$.

A.—Assume the brattice and its supports to be 6 in. wide and that on one side the clear space is 3 ft. and on the other 13 — (3 + 0.5) = 13 — (3.5) = 9.5 ft. As the height is 6 ft., there will be 3× 6 = 18 sq. ft. on one side of the brattice and 9.5×6 = 57 sq.ft. on the other.

In one case, the area $a = 18$ and in the other, $a = 57$ sq.ft.; v (which is the velocity) $= q$ (which is the quantity) $\div a$ (which is the area). Therefore, the velocity equals the quantity, which is 9,000 cu.ft. per minute divided by the area = 9000 ÷ 18 = 500 ft. per minute for the narrow side of the bratticed heading and 9000 ÷ 57 for the wide side = 157.9 ft. per minute.

Horsepower on the Air

Q.—The volume of air entering a mine is 96,500 cu.ft. per minute. The water gage reading is 2.5 in. What is the horsepower on the air? Formula: Q = W.G. × 5.2 ÷ 33,000 = hp.

A.—W.G. × 5.2 = pressure in pounds per square foot = 2.5 × 5.2 = 13. The quantity in cubic feet passing through the mine multiplied by the pressure in pounds per square foot impressed on it gives the total number of foot-pounds exerted = 96,500 × 13 = 1,254,500 ft.lb. As there are 33,000 ft.lb. in a horsepower, all that remains is to divide the number of foot-pounds by 33,000=38 hp.

Examination of Applicants for Certificates Of Competency as Mine Boss, Indiana*

How to Stop Mine Fires

Q.—(a) Name five causes of coal-mine fires. (b) State separately how you would prevent these causes from starting fires.

A.—(a) Causes for mine fires are: (1) ignition of coal by use of black blasting powder, (2) ignition of methane by open lights or sparks from trolley wheels, (3) short-circuits of electric current, (4) sparks and current leaks from electric wires, (5) fires in waste, hay, straw, oil and grease.

(b) (1)—An excellent way to eradicate the first type of fires is by ceasing to use black blasting powder and substituting an explosive that has a flame of shorter duration and length. Another way is to send runners around after the shotfirers to detect and extinguish any fires that may have been started by shots. (Strictly speaking, the employment of such men would be contrary to the Mining Laws of Indiana, Sec. 36, which forbids, with certain specified exceptions and these do not include fire runners, the employment of any men in the mine when shots are being fired. However, it does include "a reasonably necessary number of men for the purpose of securing the workings in case of a fire therein," but the fire runner is looking for fires, not securing the workings against a fire in existence already.)

(b) (2)—Mine fires caused by methane ignitions are avoided by preventing the accumulation of methane, by substituting electric safety lamps for open lights, and by providing that trolley locomotives shall not be allowed to work in an atmosphere subject to gusts of methane such as are caused when large rock falls occur. Doors must not be left open or latched back or airways left in such condition that they may cave and shut off air. Stoppings must be kept tight, and particular care must be used on days with low barometer when methane will leak from open gobs or goafs, though such places should be sealed if the gases cannot be removed or rendered harmless by ventilating air currents.—Mining Laws of Indiana, Sec. 23, (*m*). The fan and its power source must be maintained in good condition so that it will not fail and, of course, it must be kept running at all times.

(b) (3)—Short circuits are due to fallen trolley or other wires, so to some extent they are not due to electrical trouble but result

* Continued from December, 1941, *Coal Age*, p. 90.

* Continued from January, 1942, *Coal Age*, p. 63.

from a failure to support the roof in which the hangers are inserted. Care should be taken either to install hangers in reliable rock or coal or, by use of timber, paint or gunite, to protect these materials from falling.

(b) (4)—Even signal currents may cause sparks that will ignite methane and therefore signal wires should not be located where trolley wires are taboo. Any make and break in a current, if it causes a "fat spark," may result in such ignitions. Here, again, to cause a fire, methane accumulations must be present, but protection will be afforded by using low voltage for signaling. British regulations require that the voltage shall not exceed 25 volts.

Good bonding will suppress sparks and incidentally save power. Many sparks come from "sloppy" electrical work, done in a hurry under pressure from the mine boss, incompletely finished at quitting time or on leaving for another location. In such cases, the intention is to complete the job in a workmanlike manner later when convenience permits, but it is forgotten. A multitude of slack instalments make a very busy electrician, and soon he has no time to do anything right.

Standards of installation should be as vigorous as in a factory, for the mine combustibles—coal and methane—make mines more hazardous than many factories. Good porcelain hangers are essential, for leakage may easily set fire to coal.

(b) (5)—To prevent fires from ignited hay and straw, keep stables and animals out of mines. If such stables must be constructed make them fireproof, use electric lights in them installed with the utmost care, keep supplies of hay and straw at their lowest limits, bring both into the mine baled and have only one bale of each broken at a time. Care must be taken also while bringing hay and straw into the mine. Men with open lights should be kept from stables. Waste, oil and grease may catch fire from self-oxidation and should be kept in steel containers or barrels. Dirt, wood, paper and coal impregnated with oil leakage should be loaded out promptly as also all combustibles such as paper, bark and wood.

Queries Asked First and Second Class Foremen At Examination Held in State of Ohio*

First Aid

Q.—(a) What is first aid?

(b) State fully how you would administer first aid to a miner who is unconscious from electric shock.

(c) To a miner whose compound fracture of the leg half way between the knee and ankle is bleeding in spurts.

A.—(a) First aid is skilled emergency help rendered to an injured person prior to the arrival of a qualified physician or surgeon.

(b) In administering first aid to a miner unconscious from electric shock I would first move the man to a safe place and send for a doctor. Meanwhile, I would open his collar, lay him face down on a blanket, brattice cloth or coat spread on the floor, with his left arm extended directly beyond his head, his right arm extended also but bent at a right angle at the elbow. His right hand should be laid so as to appear to grasp the top of the middle of the left forearm, and his head should be turned toward the left and should rest on his right forearm, so that his nose and mouth will be free for breathing. However, it is just as satisfactory to extend his right arm beyond his head, but in that case read "left" for "right" and "right" for "left" in the above directions.

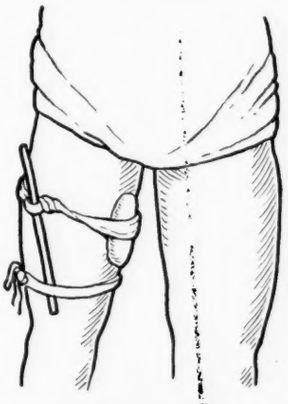
It is important that neither the breathing organs of the victim (his chest, lungs, throat or mouth) nor his circulatory apparatus (his heart and arteries) should be restricted. The weight of his head should not rest on the arteries of his arm because it might interfere with the circulation of the blood stream. I would have an assistant remove from the patient's mouth all foreign bodies, such as false teeth, tobacco or chewing gum, and loosen the tight clothing from the victim's neck, chest and waist.

I would then kneel, facing the patient's head and straddling his thighs with my knees placed at such a distance from the hip bones as would allow me to place the palms of my hands on the small of the back with fingers resting on the ribs, my little finger just touching the lowest rib with my thumb and fingers in a natural position with the tips of my fingers just out of sight.

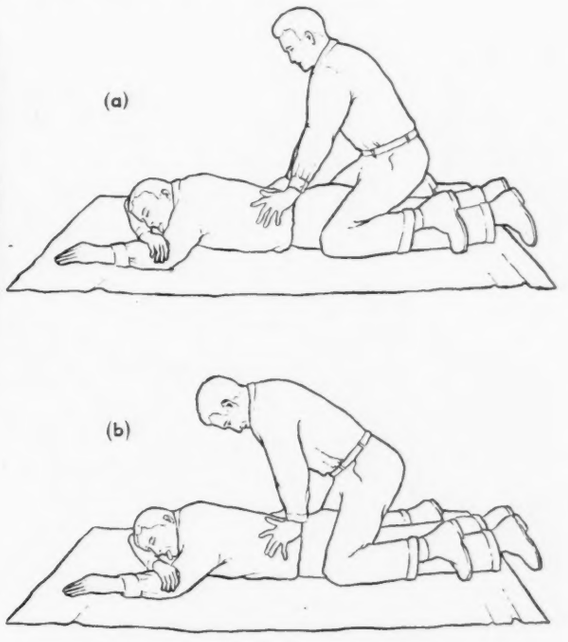
With arms held straight, I would swing forward slowly in about 2 seconds so that the weight of my body would be brought gradually to bear upon the patient and so that my shoulder would be directly over the heel of the hand at the end of the forward swing. I would be careful not to bend my elbows. Then I would immediately swing backward, so as to free the patient completely from the pressure of my hands. After 2 seconds I would swing forward again. Thus, I would repeat with the utmost regularity I could arrange, to move forward first so as to compress the lungs and then back so as to permit of their unhampered expansion, each complete respiration (one expiration followed by an inspiration) taking 4 or 5 seconds. However, I would be careful not to be rough in administering this respiration, but would continue it without let-up until natural breathing had been restored; if necessary, for four hours or more or until a physician declared the patient dead. In this work, if long continued, several men would have to take turns in the treatment.

Meantime, I would try to warm the patient exteriorly with coats and dinner pails of hot tea or coffee, if available, or with an electric lamp, but I would not give him anything to drink until he was fully conscious. If enough men were present I would send someone to get hot-water bottles to apply to the man's feet, being careful not to apply them too hot. I would always be careful not to burn the patient with any such applications. If the patient should revive before the doctor comes, I would give him some stimulant such as one teaspoonful of aromatic spirits of ammonia in a small glass of water or a hot drink of coffee or tea.

(c) When the blood escapes in spurts, it is evident that it is an artery that is severed, and the way to stop the bleeding is to press on the artery with a tourniquet at the inside of the leg on a line corresponding to the inner seam of the trousers about 4 in. below the point where the leg joins the body. The tourniquet should be loosened every 20 minutes and if the blood flows again, tighten it, but, if not, the tourniquet can be removed and a compress with tight bandage can be put on the wound.



Applying a makeshift tourniquet to stop leg bleeding.



Schaefer method of artificial respiration: (a) drawing in air; (b) expelling air.

*Continued from January, 1942, *Coal Age*, p 62.

WHAT'S NEW IN OPERATING IDEAS

Dewatering With Profile-Bar Equipment Improved by the Use of Baffles

"MANY users of profile bar screens, such as the wedge wire and the wedge bar, find that dewatering efficiency can be improved by simple methods," declares Fred Goldbeck, Wedge Bar Screen Corporation, New York, in reporting on a study of baffles. "Screens of these types usually are employed on shaking and vibrating equipment, and where there is an overload or an abnormal flow of water over the screen, increased efficiency is obtained by retarding the flow of water.

"Baffles are used to better dewatering and prevent blinding of the screen slots. This blinding often is simply a condition where the material is held in place on the screen surface and in the slot due to a too-rapid flow and excessive depth of water, causing too much pressure on the screen surface. One simple and successful baffle is made by fastening triangular strips of wood or metal on the screen surface, usually 8 to 12 in. apart, as shown in Fig. 1. These baffles retard the flow of water and material along the screen by causing the stream to flow over the baffles and descend on the far sides nearly vertically, thus keeping the screen slots open much better than where the water rushes forward in a horizontal plane. The effect is somewhat similar to that obtained with a lip or stepped screen, with the greater rigidity of the profile-bar construction.

"Some operators in the anthracite field use another simple retarder which acts even better than the baffles. This device (Fig. 2) consists of a piece of pipe about 1½ in. in diameter flattened at both ends, with the flattened ends bent up and slotted. The pipe is arranged across the screen at right angles to the flow and is attached to the shaker sides by bolts. This baffle can be adjusted as to height by the bolts and slots in the flattened ends of the pipe and raised or lowered with respect to the screen surface to allow for varying rates of feed to the shaker. The idea is to have the bottom of the pipe touch the top of the normal water flow. When there is a sudden increase in flow, the water climbs the barrier and drops back into the stream on the far side, which gives satisfactory retardation until normal flow is resumed.

"One operator overcame a bad screening condition due to a 6,000-g.p.m. flow of water to the shaker by employing the device shown in Fig. 3. It consisted of a discarded section of chute fastened on an incline between the sides of the shaker. The chute was perforated with 1-in. round holes. As the stream came down the shaker it was deflected upward along the inclined chute and the water and coal dropped through the holes, thus retarding the flow very effectively. This simple device gave very satisfactory performance by retarding the flow and keeping the slots clear, due to the vertical drop onto the bar screen."

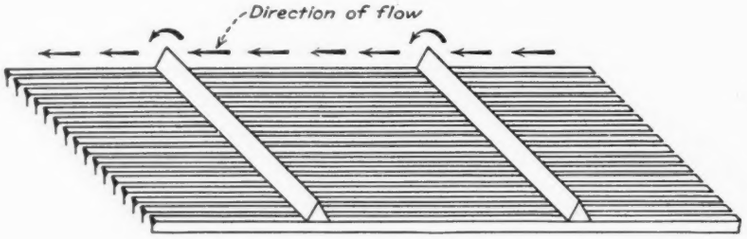


Fig. 1—Triangular baffle strips on profile-bar screen.

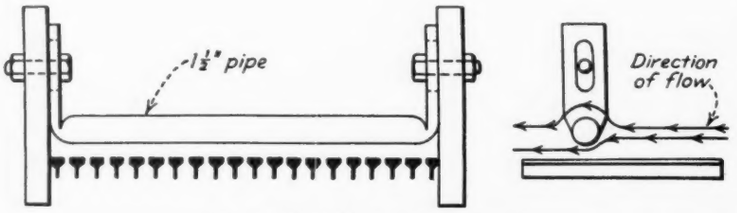


Fig. 2—Adjustable round-pipe baffle.

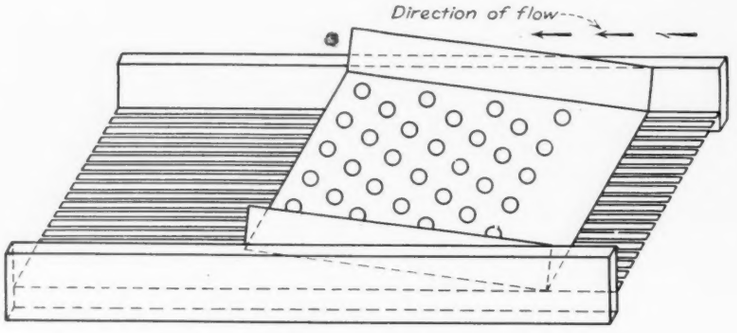


Fig. 3—Perforated chute-type retarder.

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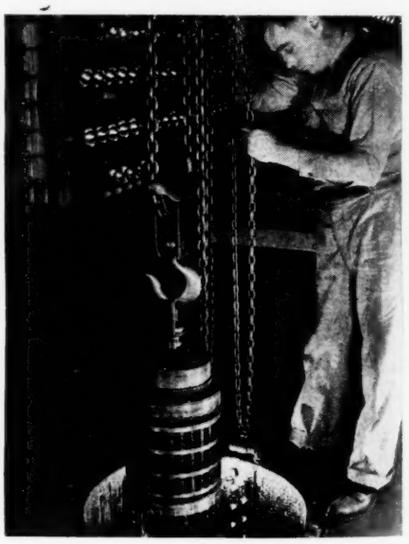
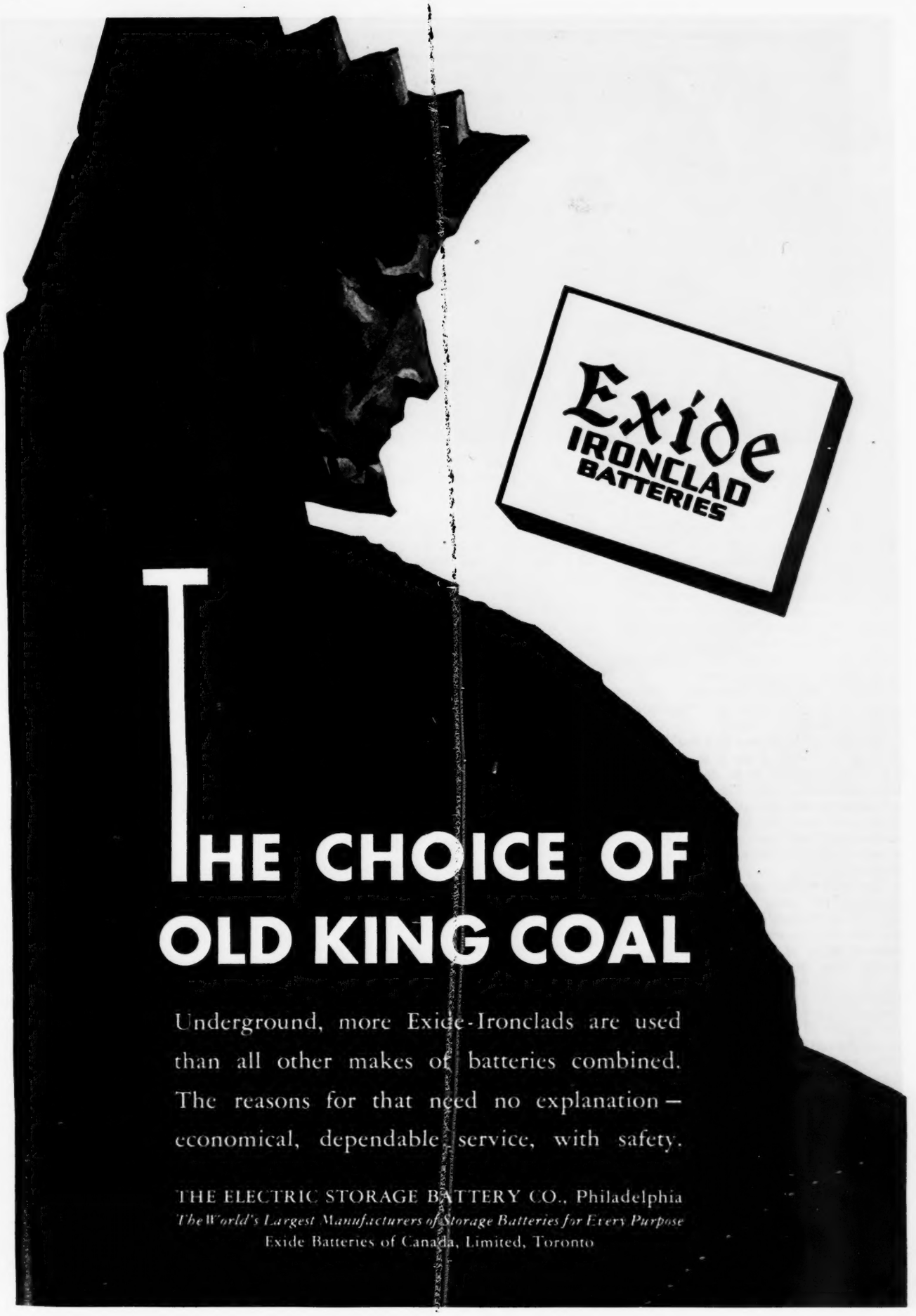
Armature Repairs Speeded With Infra-Red Lamps

Low first cost, economies in installation time and increased speed in drying were the major reasons for the decision of a western Pennsylvania coal company to replace the



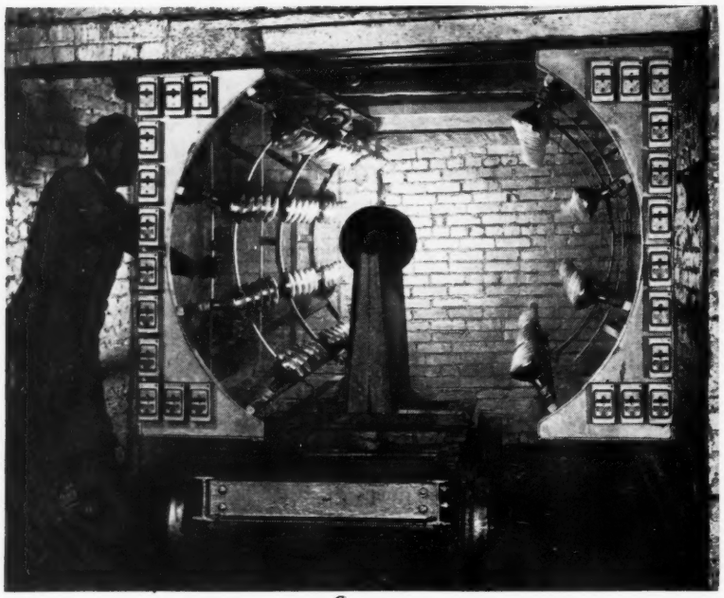
Armatures drain in vertical position after dipping.



THE CHOICE OF OLD KING COAL

Underground, more Exide-Ironclads are used than all other makes of batteries combined. The reasons for that need no explanation — economical, dependable service, with safety.

THE ELECTRIC STORAGE BATTERY CO., Philadelphia
The World's Largest Manufacturers of Storage Batteries for Every Purpose
Exide Batteries of Canada, Limited, Toronto



Showing the radiant-heat lamp installation with armature in place for baking. The lamps are focussed by sliding them on their barn-door hangers to the proper position.

steam-heated armature oven in its shop with radiant-heat lamps, reports H. C. McDaniel, sales engineer, Lamp Division, Westinghouse Electric & Manufacturing Co. About 25 motors, ranging in size from small pump motors to large locomotive motors, are repaired each month in this shop, which serves four mines. "The 120 250-watt R-40 bulb-reflector drying lamps chosen for the job have cut the previous baking time of 18 hours for a 12-in. armature to five hours. Emergency jobs are baked in less time than the stripping and rewinding operations require.

"The original brick oven had double metal doors at one end and was 6 ft. 5 in. high, 8 ft. 3 in. wide and 10 ft. deep, with red-brick walls 9 in. thick. The air was circulated by a blower, with an exit in the center of the oven roof. The old oven was heated continuously and was much larger than actually needed for the average repair work in process.

"The new radiant lamp design permitted revamping the steam oven without changing its construction, except for removal of the doors and the venting in the roof." Two identical banks of 60 lamps each are suspended from the roof on barn-door hangers, which permits moving them back and forth so that they may be placed the proper distance (7 in.) from the armature surface. The number of lamps used depends upon the weight and diameter of the armature.

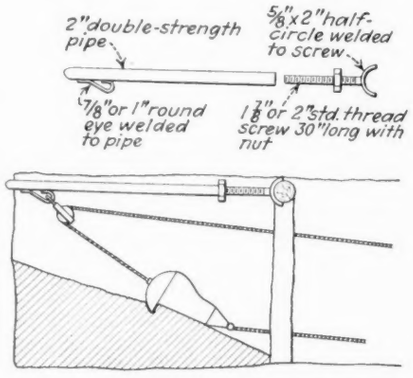
The two banks are divided into three 10-kw. sections, each consisting of eight five-lamp groups. The power supply is single-phase, three-wire, with individual 30-amp. switches for the 24 five-lamp groups making up the total load of 30 kw. Dividing the lamps into three 10-kw. sections makes it possible to bake three armatures simultaneously. There is approximately 15 in. between sections, or enough clearance for the legs of the supporting trucks.

"Armatures dipped in varnish are allowed to drain in a vertical position. This avoids any accumulation of varnish in the core vents which would produce unbalanced running conditions or splatter if the motors were overloaded. Varnish needs to be heated for a definite time to properly polymerize the oil constituent, thus completely sealing all voids and producing a dry surface condition." Baking temperatures, Mr. McDaniel states, range from 240 to 260 deg. F., and the oven is cool enough at all times to permit the operator to enter and check progress. "Baking times now range from 3 to 9 hours for armatures from 6 to 18 in. in diameter."

•

Anchor for Scraper Tail Sheave Braced Against Crossbar

To facilitate scraper operation in heading and tunnel driving, John Fingeroos, Wakefield, Mich., suggests the anchor shown in the accompanying illustration. It is made of 2-in. double-strength pipe with an eye for the tail sheave welded on near the face end. The other end accommodates a screw with half circle, which is placed against the crossbar to hold the anchor in place. Length of the anchor can be made to suit conditions, and also, Mr. Fingeroos states, it may be pressed into service as a timber jack in emergencies or during regular operation.


2"double-strength pipe
5/8"x2"half-circle welded to screw
7/8"or 1"round eye welded to pipe
1 1/8"or 2"std.thread screw 30"long with nut

Showing construction and use of scraper tail-sheave anchor.

Stretch Game

More from the same is the watchword today but it soon may be more from less in coal mining as well as in all other walks of life in America at war. In either case, the idea is to make equipment and producing facilities yield more coal more efficiently and more safely. Things must click better than ever and therefore an idea—it may be very simple — may be even more valuable as a means of helping coal meet war-time demands. Coal Age will pass the ideas around if you —operating, electrical, mechanical and safety men—will send them in. Do it now. Include a sketch or photo if it will help to make them clearer. For each acceptable idea, Coal Age will pay $5 or more on publication.

Sand Boxes Made by Welding In Old Ben Shops

Cast-iron sand boxes often take a beating in underground transportation, particularly where inside-frame locomotives are used and the boxes are exposed to everything that happens. Breakage in such service has led to the occasional use of fabricated steel sand boxes by locomotive manufacturers.

Arc welding resulted in this set of sand boxes.

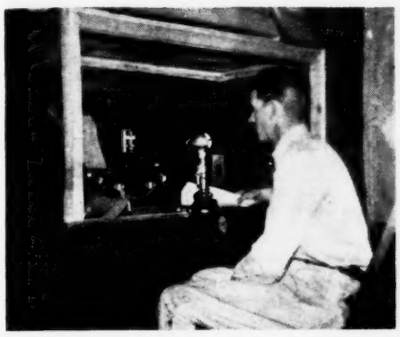
The accompanying illustration indicates how good a job arc welders at the Old Ben Coal Corporation, in southern Illinois, can do in fabricating sand boxes. This set is made of ¼-in. steel plate with steel covers. Bottoms and sand valves are the manufacturer's parts for this particular locomotive.

•

Safety Messages Broadcast From Station ABC

Music and safety messages are broadcast each day just before the man-trip leaves from a station 2½ miles underground by W. H. Roll, superintendent, Harvey Coal Corporation, Harveyton, Ky. The microphone for Station ABC (Always Be Careful) is installed in the mine office (see illustration) with a loudspeaker at the man-trip station and another outside on top of the lamphouse for the men on the surface. Speakers and microphone are hooked up with the mine telephone system through the use of an amplifier.

In his daily broadcasts, Mr. Roll discusses accidents which have occurred, including



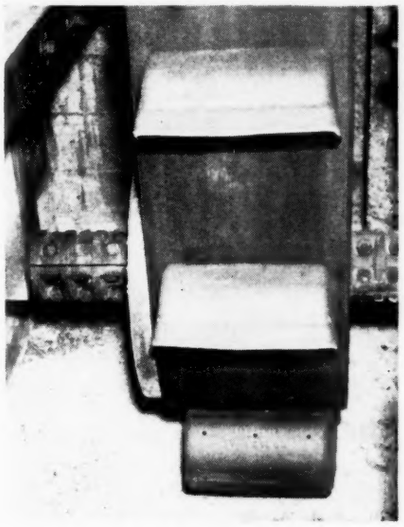
From this point, daily safety messages and music are broadcast at the Harvey Coal Corporation mine.

those in other mines, and how they might have been prevented, as well as unsafe practices which have been reported by the section foreman and how they can be eliminated.

•

Holes In Bottom of Buckets Improved Discharge

Trouble due to the delayed discharge of solid-type elevator buckets handling wet fine material at a mine in the Middle West was diagnosed as caused by unbalanced air pressure rather than the slight tendency of the material to stick to the bucket metal.



Air inlet holes show in the lowest bucket.

The difficulty was eliminated by drilling three 3/16-in. holes in the bottom of each bucket. Now, when the buckets invert at the head pulley, air entering through the small holes prevents the formation of the partial vacuum which caused the trouble.

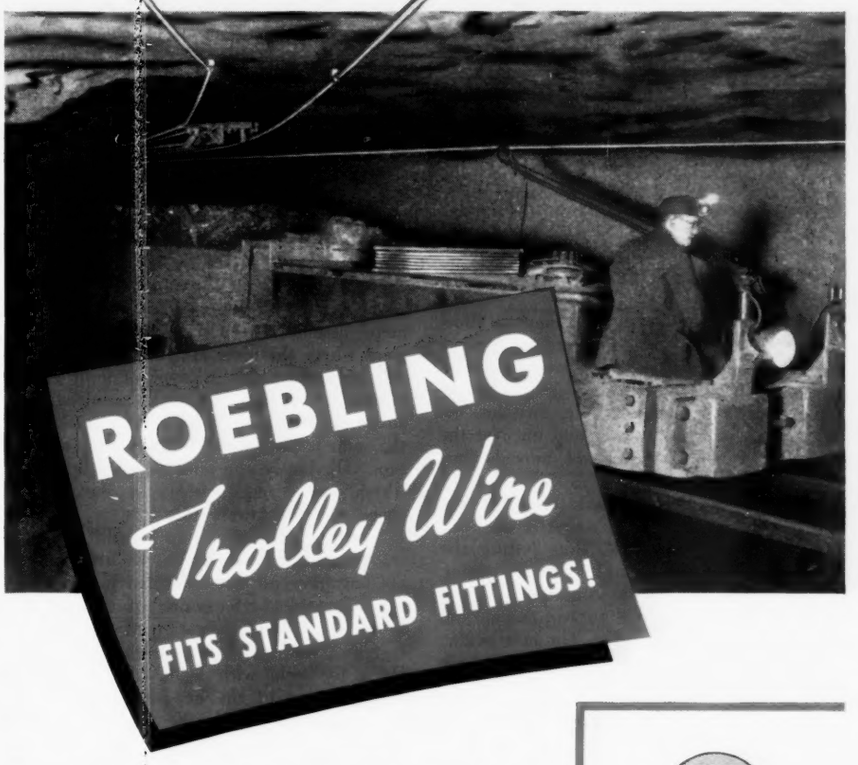
•

Reflectors With Movable Shields Show Switch Position

For use on electric switches, which normally are operated from a distance, Louis Koskovich, electrician and motor boss, Blaine (Ohio) mine, Lorain Coal & Dock Co., suggests the safety device for indicating switch

For your mines

MAIN ARTERIES



ROEBLING *Trolley Wire*

FITS STANDARD FITTINGS!

Take a leaf from the ledger of some of the country's biggest mine operators. They specify Roebling Trolley Wire exclusively — because it not only stands up under the grind of continuous operation — but saves time and trouble making replacements.

Maintenance men like it because it comes in the section and size to fit standard fittings *exactly* — cuts time out for replacement to a minimum. Operating men like it because it's hard-drawn to resist abrasion and maintain alignment — resulting in less wear, longer service. And purchasing men like the fact that they order Trolley Wire along with all their other Roebling wire and cable requirements — from one reliable source of supply.

Roebling Copper Trolley Wire for mine and industrial haulage applications is available in round, standard grooved, FIGURE 9 deep section grooved, and FIGURE 8. Roebling Bronze grades can be furnished in round and standard grooved sections.

ROUND SECTION

STANDARD GROOVED

FIGURE 8

FIGURE 9
DEEP-SECTION GROOVED

OVER 60 OTHER TYPES of Roebling Electrical Wires and Cables are made in our mills under complete Roebling supervision and inspection—from copper bar to final reeling or spooling. They include: Power Cables, Bare Wire and Strand, Building Wire, Portable Cords and many others.

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JOHN A. ROEBLING'S SONS COMPANY
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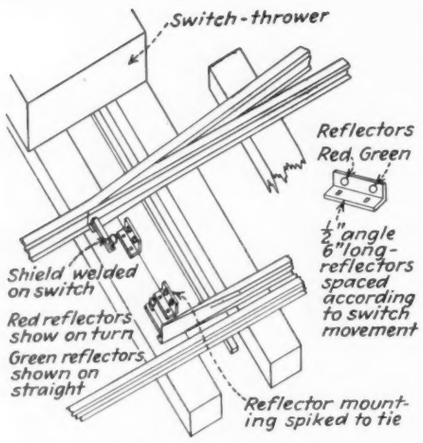


Diagrammatic sketch of switch-position indicator.

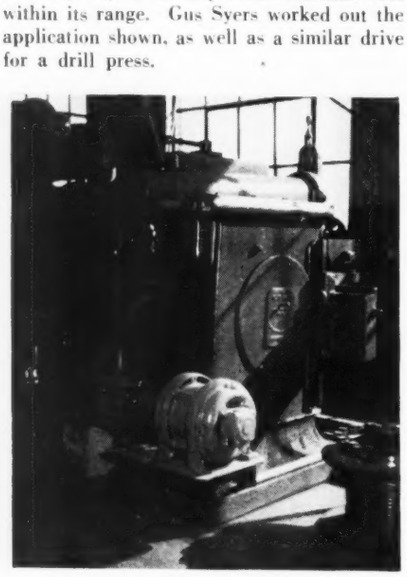
position shown in the accompanying illustration. It consists essentially of two reflector sets, each with red and green reflectors, spiked to the tie on which the switch points rest. Shields welded on the switches as shown in the drawing cover and uncover the reflectors as the switches are moved, thus showing their position.

In case a bolt or lug should break so that one switch fails to move, one red and one green reflector will show, thus letting the motorman know the switch is out of order. Thus, derailments, with consequent possibility of injury, damage to equipment and loss of tonnage, are avoided. The cost is 20c. for the four reflectors. Other materials are taken from the scrap supply.

•

Gear-Shift Drive Applied To Machine Tools

Rescued from an automobile graveyard, the Dodge gearshift shown in the accompanying illustration provides almost instantaneous speed changes on this shaper in the shop of the Delta Coal Mining Co., near Marion, Ill., or on any other machine tool within its range. Gus Syers worked out the application shown, as well as a similar drive for a drill press.



The gear-shift permits speed changes on this shaper with a twist of the wrist.

Conservation of Welding Electrode Promoted By Attention to Good Working Rules

"THE NECESSITY of conserving materials in the war effort is nowhere more urgent than in welding," declares Clayton B. Herrick, welding engineer, Lincoln Electric Co., in opening a discussion of possible conservation methods. Several factors, Mr. Herrick states, affect the most efficient use of electrodes, and if they receive the proper attention the result will be a still faster production rate by the use of welding and full utilization of welding materials. Among the things that can be done are:

"*1. Select the Right Type of Joint and Be Careful of Fit-Up*—There is a type of joint (see accompanying list) best suited to the particular job. A serious waste of weld metal results from using a more complicated joint where the more simple type of connection suffices. Since the type of joint greatly affects the quantity of metal required, it is suggested that a study be made to make sure the joint is proper for the particular application. Obviously, the joint to select is the one which meets requirements at the greatest speed and the lowest cost.

"Joints and their fit-up should be given most careful consideration, as fit-up affects not only the cost of the welded joint as such but also the performance of the finished product. As an illustration of the effect of cost in a very simple fit-up, see Fig. 1, showing a tee weld with ¼-in. plates. Assume that the cost of the deposited metal is $1 per pound. Then, if the joint is properly fitted up, the cost per foot of joint (two beads) would be $0.40. If, however, there is a gap between the vertical plate and the horizontal plate of $\frac{1}{16}$ in., the cost is increased to $0.58 per foot. If this discrepancy is ⅛ in., the cost is increased to $0.80 per foot, resulting in differences of $0.18 and $0.40 for the $\frac{1}{16}$- and ⅛-in. gaps. Obviously, money spent in obtaining good fit-up is readily saved in welding. . . .

"*2. Choose the Correct Type of Electrode*—While the general-purpose electrode will produce satisfactory welds under virtually every condition, special electrodes, such as heavily coated fast-flowing types, might prove more efficient. The electrode should be chosen with respect to: (a) physical properties required; (b) type of joint; (c) position of welding—flat, vertical, overhead or horizontal; and (d) condition of fit-up of the work. Recommendations of the equipment manufacturer should be considered.

"*3. Use an Electrode Which Maintains a Uniform Coating*—The electrode coating, if not correct, will cause rejects not only of the electrodes themselves but possibly of the welds produced by their use. It should be remembered that the coating not only produces the protecting shield but that it also controls: (1) fluidity of the metal; (2) penetration; (3) shape of the beads; (4) physical properties of the deposit; and (5) composition of the deposit.

"*4. Use Electrodes Which Provide Proper Physical Properties*—Electrodes manufactured today are clearly described by the manufacturer with respect to the quality of weld they will produce. Required physical properties of the work at hand should be known and the electrode should be selected to meet those requirements.

"*5. Use Fast-Flowing Electrodes Wherever Possible*—Certain electrodes are manufactured today to permit the fastest possible welding under specified conditions. It is obvious, therefore, that electrode and also time will be saved if these fast-flowing types are used wherever practicable.

"*6. Select an Electrode Which Keeps Splatter and Slag Loss at a Minimum*—Since all splatter is a waste of weld metal, the importance of this is obvious. It should be realized that the splatter loss of electrodes varies and care should be taken to avoid use of those which have excessive losses.

"*7. Wherever Possible, Use Electrodes Which Produce Flat Beads*—It is a waste of welding electrode to deposit any more metal than is required. Not only is the welding electrode wasted but time is required to remove the excess metal from the welded joint.

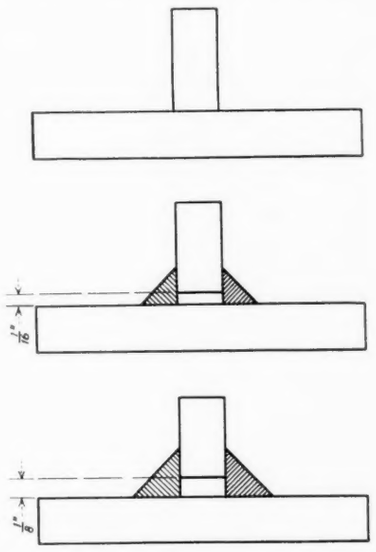


Fig. 1—Joints should be correctly fitted-up

A gap in the plates to be joined makes a difference of 0.18 and 0.40 lb. of metal per foot for gaps of $\frac{1}{16}$ in. (center) and ⅛ in. (bottom). With the proper fit-up (top), metal deposited per foot of joint is 0.40 lb.

"*8. Select the Right-Sized Electrodes*—The largest-diameter electrode which can be used effectively is the best from the standpoint of electrode conservation. The savings run up to 40 percent per pound deposited—for example, when ¼-in. is used instead of $\frac{5}{16}$-in. (Fig. 2).

"*9. Use Long Electrodes in the Larger Size*—The obvious result is a reduction in the number of stub ends and in time saved by reducing the number of interruptions to change rods. The 18-in. length should be used in ¼-in. and larger sizes.

"*10. Do Not Bend Electrodes*—This generally unnecessary habit will waste one-quarter to one-third of the electrode. Use electrodes straight and get the maximum deposited weld metal from each rod.

"*11. Use Proper Voltage and Current Set-*

Sixteen Types of Welded Joints

Proper joint to select is the one which meets service requirements and costs the least. Obviously, if requirements are met by the simpler type of joint, which requires less machining and less electrode, it is a waste of time, labor and materials to use a more complicated type.

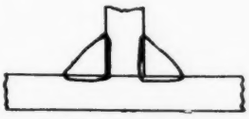
1. PLAIN BUTT JOINT—Largely used on plates up to ⅜ in. thick with metal electrode; ¾ in. with carbon electrode, although generally below this. Inexpensive as to joint preparation. Suitable for all usual load conditions if full penetration is secured.

2. SINGLE-V BUTT JOINT—Used largely for ⅜-in. plate or thicker. Scarfing and machining costs more than Type 1 and more electrode is used. Employed generally on plates thicker than in Type 1. Meets all general or usual load conditions.

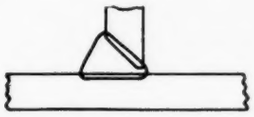
3. DOUBLE-V BUTT JOINT—The cost of machining is greater but less weld metal is used than in Type 2. Cost of machining and welding should be balanced against each other. Use largely for ½-in. and heavier and for all usual loads. Note that joint is welded from both sides.

4. SINGLE-U BUTT JOINT—Generally used on plates heavier than preceding: ½-in., ¾-in. and over. Costs more to machine than single V but requires less electrode. Is welded from one side, except a single bead, which is put in last on opposite side. Meets all usual load conditions. Usually employed for best-quality work.

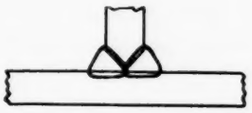
5. DOUBLE-U BUTT JOINT—Used where welds can be made from both sides in plate sizes usually heavier than in Type 4 and where the saving in electrode justifies the greater machining cost as compared with the double V. Used for all types of loads.



6. PLAIN FILLET-WELDED TEE JOINT—May be used for all ordinary plate sizes. No machining of plates. Most satisfactory when welds are in longitudinal shear. For welds heavily loaded transversely by fatigue or severe impact, use with caution.

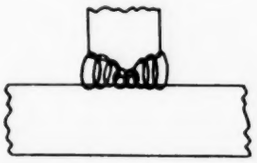


7. SINGLE-V TEE JOINT—This is better than Type 6. For work welded from one side. Generally used on ½-in. plates or lighter. Costs more for joint preparation but uses less electrode than Type 6. For more severe load conditions.



8. DOUBLE-V TEE JOINT—Used for heavy plates. Welded from both sides. Uses less electrode than Type 6. May be used for severe longitudinal or transverse loads of all kinds.

9. SINGLE-U TEE JOINT—For usual plate sizes, generally 1-in. and heavier. Welded from one side only. Advisable to put in a final finishing bead on side away from U. Machining costs more but less electrode is required than with single V. For same load conditions as single V (Type 7).

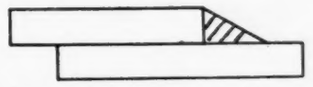


10. DOUBLE-U TEE JOINT—For plates generally 1½ in. and heavier which can be welded from both sides. More expensive preparation but uses less electrode than Type 8. For all load conditions, even very severe.

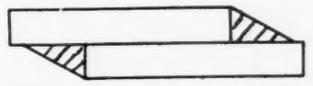
11. FLUSH CORNER JOINT—Generally used for 12-gage and lighter. May be used for heavier plates with caution. Not for very severe loads on heavier plate.

12. HALF-OPEN CORNER JOINT—Generally used for 12-gage or heavier, where welded from one side only. "Shouldering" effect reduces possibility of burning through and makes for easy welding. May be used for ordinary loads, but with caution for fatigue or impact loads.

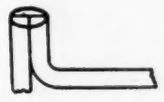
13. FULL-OPEN CORNER JOINT—Used for all plate thicknesses when welds can be made from both sides. May be used under severe load conditions for maximum strength.



14. SINGLE-BEAD LAP JOINT—May be used for all sizes of plates where joints are not subject to excessive fatigue or high impact loads.



15. DOUBLE-BEAD LAP JOINT—May be used for load conditions more severe than single-bead lap joint. Beads should be full size and joints may be loaded more severely than with Type 14. The butt joint (1 to 5) is the best joint for very severe service but of course is more expensive.



16. EDGE JOINT—Generally used for ¼-in. or thinner. Not recommended for heavier work. For loads which are not very severe.

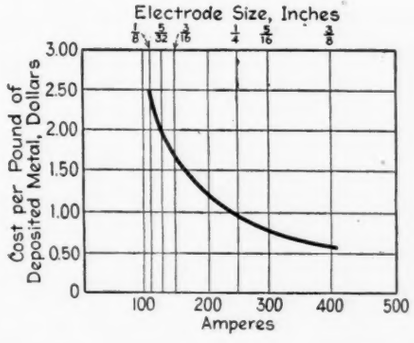


Fig. 2—Larger electrodes promote economy.

The effect of electrode size on economy is shown in the chart at the left and the table below. Note how cost of welding goes down as electrode size goes up. Note, also, electrode consumption rate, pounds of electrode deposited per hour, number of stub ends (indicated by interruptions per pound) and cost of interruptions to change electrodes.

EFFECT OF CHANGING ELECTRODE SIZE

	Electrode Size, Inches					
	1/8	5/32	3/16	1/4	5/16	3/8
Amperes	110	130	130	250	325	425
Arc volts	24	25	26	30	34	38
Kw. at arc	2.64	3.25	3.9	7.5	11.1	16.1
Consumption, lb. per hour	2.6	3.3	3.95	7.5	10.7	16.2
Deposit, lb. per hour (50-percent operating factor	0.87	1.1	1.32	2.5	3.57	5.4
Set efficiency, percent	47	50	51	55	59	59
Kw. input	5.6	6.5	7.65	13.65	18.8	27.3
Interruptions per lb. consumed	18	12	8	5	3	2
COST PER POUND DEPOSITED						
Labor	$1.150	$0.909	$0.758	$0.400	$0.280	$0.185
Overhead	1.150	0.909	0.758	0.400	0.280	0.185
Power	0.064	0.059	0.058	0.055	0.053	0.051
Electrode	0.150	0.135	0.127	0.127	0.127	0.127
Cost of interruptions (including overhead)	0.050	0.033	0.022	0.014	0.008	0.005
Total	$2.564	$2.045	$1.723	$0.996	$0.748	$0.553

tings—Every electrode manufactured is designed to operate at a certain voltage and within a specified current range. If current is too high or too low it will manifest itself either in excessive splatter loss or inferior welds (Fig. 3) having improper fusion and penetration.

"*12. Follow the Procedure Specified for the Electrode*—Accompanying each different electrode manufactured are detailed specifications regarding procedures to be followed. These specifications have been prepared carefully by the electrode manufacturer and if followed consistently will prevent waste of electrode and assure high-quality welding.

"*13. Avoid an Excessive Number of Beads*—If one bead of weld metal will meet design requirements it obviously is a waste of electrode to put on additional beads. This also applies to jobs where two beads suffice, etc.

"*14. Use Electrode Down to Minimum Stub End*—Remember that the electrode can be used the entire length of its coated surface. Leaving anything more than a minimum stub end is an obvious waste. By using care in gripping the electrode at its extreme end in the holder and burning it down to the maximum extent the operator is rendering a patriotic service in saving electrode. Just a ½-in. difference in the stub end saves 3½ percent on an 18-in.-length rod. In one welding shop, the great variation in stub ends resulted in a waste of 17½ percent, representing, in the time covered, a cost of $268.36.

"*15. Collect and Save Stub Ends of Electrodes*—At the rate at which welding is being used today in war production the metal which would be wasted by failure to save stub ends would be tremendous. The average stub end is 2 in. long and this length multiplied by the millions of electrodes used would constitute a great loss.

"*16. Use Modern High-Capacity Welding Generators*—Welding generators manufactured today have much higher capacity and efficiency. For example, a modern 40-volt generator was shown to produce 7.7 in. of joint per electrode against 6.6 in. for an older machine."

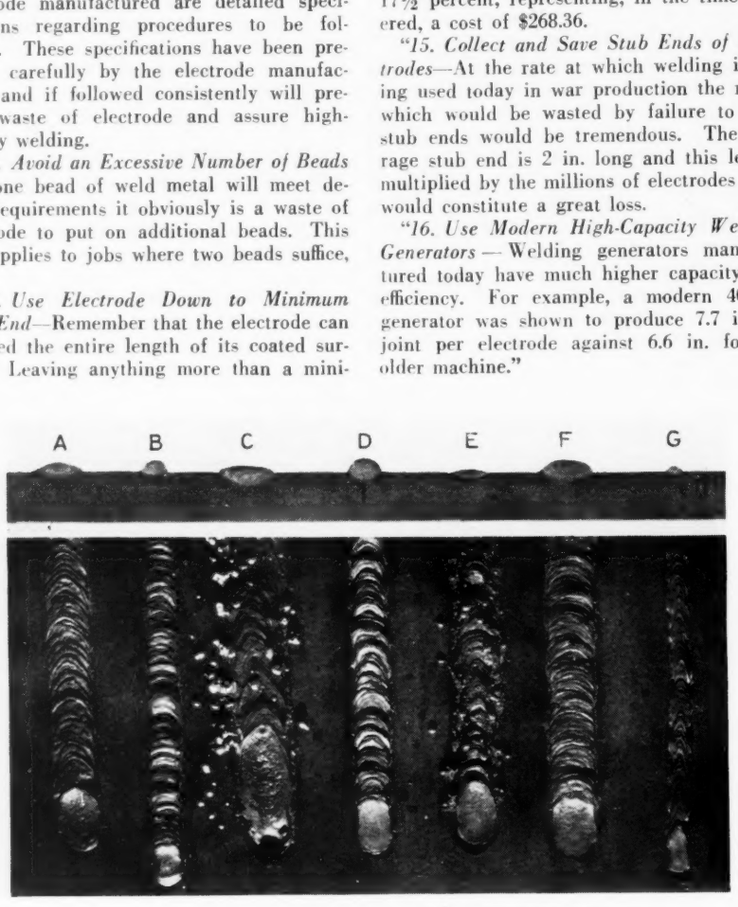


Fig. 3—Proper welding procedure saves electrode

Characteristics of welds are a good check on electrode conservation. The effect of varying one factor in procedure is indicated below. Note what happens to electrode burn-off rate, weld penetration, appearance of weld and arc sound when "arc current," "arc volts" and "arc speed" are varied from normal.

RESULTING WELD CHARACTERISTICS (SEE ILLUSTRATION ABOVE)

	F	A	B	C	D	E	G
Arc current	Normal	Low	High	Normal	Normal	Normal	Normal
Arc speed	Normal	Normal	Normal	Low	High	Normal	Normal
Burn-off of electrode	Normal appearance; coating burns evenly	Practically same as preceding	Coating is consumed at irregular high rate; watch carefully	Coating too close to crater; touches molten metal, resulting in porosity	Drops at end of electrode flutter and then drop into crater	Normal	Normal
Penetration fusion (crater)	Fairly deep and well defined	Not very deep or well-defined	Deep, long crater	Small	Wide and rather deep	Normal	Small, rather well-defined crater
Appearance of bead	Excellent fusion. No overlap	On top of plate. Not as much overlap as with bare rod	Broad, thin bead. Good fusion	High bead, not as pronounced as for low amp. Somewhat broader	Wide spatter	Wide bead, large overlap. Base metal and bead overheated	Small bead, undercut. Reduction in bead size and undercutting depend on speed and amperes
Arc sound	Sputtering sound plus sharp crackling	Irregular sputtering; some crackling	Regular explosive sounds	Hiss plus steady sputter	Soft sound plus hiss and few crackles	Normal	Normal

Electrical Welding Makes All-Steel Sand Car

The all-steel sand car shown in the accompanying illustration was made by G. W. Moody, master mechanic, H. E. Harman Coal Corporation, Harman, Va. Dimensions are: length, 12 ft.; width, 7 ft.; height, 18 in. Materials include 6x6x⅜-in. angles from bumper to bumper; 10x10-in. H-beam bumpers; and ⅜-in. sheet for the bottom, sides and ends. The car has stub axles. Boxes can be removed without unloading. Construction was by electrical welding, with smooth bottom so that the sand can be removed with a shovel. The car holds 6 tons of sand.

This sand car was fabricated by electrical welding.

•

Night Light for Strip Work Mounted on Special Truck

When an operating or maintenance man at a strip mine gets in a tight place on a stormy night, nothing is so welcome as a flood of light. That is just what Ted Bergrun had in mind when he constructed the portable floodlighting equipment shown for the Midland Electric Coal Corporation, Farmington, Ill.

The truck is light in weight, easy to move by hand or automobile, and sturdy as well. The flood lamps are copper incased, weatherproof and durable. The mounting permits rotation in a complete circle horizontally and vertically to reach a sheave at the tip of a boom or a water hole in the bottom of the pit. Cable connections may be made at any point where 220 volts is available.

Too small to spot airplanes but plenty of light for strip work.

Scully Service

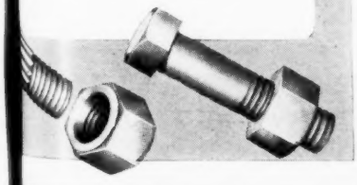
Structural material
Plates, various qualities
Floor Plates
Sheets: Hot Rolled, Cold Rolled, Galvanized, etc.
Bars (all shapes): Hot Rolled, Carbon and Alloy grades
Hot Rolled Strip Steel
Spring Steel · Tool Steel
Drill Rod
Cold Finished Bars, Carbon and Alloy grades
Wire
COR-TEN and MAN-TEN Shapes, Sheets and Plates
Abrasion-Resisting Sheets and Plates
Eaves Trough, Conductor Pipe
U·S·S Stainless Steel and Stainless products
Expanded Metal
Rails
Boiler Tubes
Rivets, Bolts, Nuts, Washers
Dardelet Rivet and Machine Bolts
Nails
Welders and Welding Accessories
Chain
Clamps
Flanges
Expanders, etc.
Hoists, Shears, Rolls, Punches, Cut-Off Machines, Saws, Nibblers, etc.

In Stock! Dardelet Bolts

We can offer immediate shipment of both Dardelet Rivet Bolts and Dardelet Machine Bolts. These bolts save valuable time and labor and assure permanently tight bolts.

The Dardelet Rivet Bolt is a ribbed bolt with Dardelet self-locking thread, and is widely used for field erection of structural steel. Has recessed nut. Bolt is driven in and nut is applied with wrench. Economical and strong.

The Machine Bolt with Dardelet self-locking thread is for general use where vibration is present.



ELS THAT MEET THE CHALLENGE OF TODAY AND TOMORROW

USS

Don't give up without calling Scully!

CHICAGO	**BRUnswick 2000**
Teletype CG. 605	
BALTIMORE	**GILmore 3100**
Teletype BA. 63	
BOSTON	**STAdium 9400**
CLEVELAND	**HEnderson 5750**
Teletype CV. 153	
PITTSBURGH	**CEdar 7780**
Teletype PG. 475	
ST. LOUIS	**MAin 5235**
MINNEAPOLIS - ST. PAUL	**NEstor 2821**
NEWARK, N. J.	**BIgelow 3-5920**
	BErgen 3-1614 - REctor 2-6560

SCULLY STEEL PRODUCTS COMPANY

Distributors of Steel and Steel Products

UNITED STATES STEEL

WHAT'S NEW IN THE FIELD

Bituminous Mine Realizations and Cost Released by Coal Division

A PRELIMINARY summary of mine realization on shipments of bituminous coal for the twelve months' period ending Sept. 30, 1941, for rail and river mines and other mines of over 50 tons daily capacity has been made public by the Bituminous Coal Division. The study indicated that actual realization for that period by these mines was $2.13, against what would have been an average of $2.01 per ton if all coal had been sold at minimum prices.

Tonnage accounted for in the realization tables totals 84.46 percent of production, with the 15.54 percent not included representing tonnage of non-code member mines, of code member truck mines having less than 50 tons' daily capacity, and of all other code member production represented by such items as colliery fuel, sales to employees, coal for beehive coke, and incomplete and late reports. It previously had been estimated by the Division that minimum prices would yield producers an average of $2.06 per ton. The Coal Division explains that the mine price realization figures show that most of the increases in actual sales prices over minimum prices took place after coal production was resumed following the suspension of mining during negotiations that resulted in general wage increases.

Following the publication of mine realizations the Division released its findings in General Docket 21, giving $2.1947 as the weighted average cost per ton of bituminous coal in the United States, or an increase of 10.73c. over that in General Docket 15, on which previous prices were based.

To Renew Policy on Costs

Secretary of the Interior Ickes stated on Feb. 21 that he has granted certain requests for him to review particular questions of law and policy pertaining to the new weighted average costs. Denying all other requests, Mr. Ickes specified in an order that his review would cover the following:

1. Whether the divisor to be used in computing the per ton reasonable selling costs should be the total ascertainable tonnage or the total tonnage sold on the open market.

2. Whether the criteria employed by the Acting Director in determining "reasonable costs of selling" were correct.

3. Whether the Bituminous Coal Act permits the adjustment of the weighted average of the total costs obtained for 1940 in order to reflect changes established to have occurred in 1941.

4. What the standards of quantity and quality of proof shall be to establish anticipated changes in cost accounting in 1941.

The Division has denied a request for an order to permit producers to charge minimum "industrial use" prices in selling certain coals to the State of North Carolina for use in heating public buildings. This ruling continues in effect regulations requiring producers to charge not less than the minimum prices applicable to coal sold for "domestic use" in selling the State certain "double screened" sizes.

An order has been entered that will enable the Tennessee Valley Authority to begin immediate use of Tennessee River barge facilities for the shipment of coal to tap a new source of fuel for the Wilson Dam steam power plant at Sheffield, Ala. The order establishes temporary minimum prices covering truck-river shipments into Market Area 117, in northern Alabama, from mines in Subdistrict 4, District 13, which are within a 30-mile radius of the river loading facilities at South Pittsburg, Tenn.

Trial Examiner Charles O. Fowler has recommended that the Division adopt a more definite rule enabling New England dock operators to ascertain which resale transactions entitle them to purchase coal from the producers at a discount from minimum prices established under the Coal Act.

The Division has granted a request of the city of Cincinnati and the Cincinnati Board of Education for an opportunity to prove that certain restrictions should be removed from permission granted the petitioners to purchase barge-shipped coals at special minimum prices for river shipments. A hearing will be held at Washington, D. C., on March 16.

Acting Director Dan H. Wheeler of the Coal Division said on Feb. 6 that the U. S. Circuit Court of Appeals for the Eighth

Coal Division Realization and Cost Figures

	Average Realization per Ton			Cost Determinations, General Docket, No. 21	
	Minimum Price Realization as Estimated, Prior to Oct 1, 1940	1940–41 Minimum Price Realization	Actual Prices Received	Determined Weighted Average per Ton, This Proceeding	Changes in Weighted Average per Ton From General Docket 15
Minimum Price Area 1					
Dist. 1: Cent. Pa., Md. and part of Northern W. Va.	$2.19	$2.18	$2.32	$2.4242	3.55c.
Dist. 2: Western Pa.	2.04	2.03	2.18	2.2508	3.68
Dist. 3: Northern W. Va.	1.85	1.85	1.93	1.9143	7.77
Dist. 4: Ohio	1.98	1.95	1.98	1.9377	0.21
Dist. 5: Michigan	3.83	3.68	3.99	4.2215	56.72
Dist. 6: W. Va. "Panhandle"	1.96	1.95	1.95	1.8907	−8.68
Dist. 7: So. W. Va. and Va. "Smokeless"	2.19	2.17	2.34	2.4055	21.15
Dist. 8: So. W. Va., East Ky., part of Va. and Tenn.	2.09	2.03	2.20	2.2521	22.20
Price Area 1 Average	2.09	2.05	2.20	2.2503	12.19
Minimum Price Area 2					
Dist. 9: West Ky.	1.59	1.55	1.60	1.7052	12.47
Dist. 10: Illinois	1.80	1.76	1.76	1.7899	3.38
Dist. 11: Indiana	1.72	1.65	1.69	1.6093	−4.32
Dist. 12: Iowa	2.71	2.62	2.68	2.7183	−4.53
Price Area 2 Average	1.79	1.73	1.74	1.7725	1.03
Minimum Price Area 3					
Dist. 13: Alabama	2.47	2.43	2.59	2.7500	31.18
Minimum Price Area 4					
Dist. 14: Arkansas-Okla.	3.67	3.48	3.62	3.8360	22.80
Minimum Price Area 5					
Dist. 14: Missouri-Kansas-Oklahoma field	1.98	1.94	2.06	2.0739	3.47
Minimum Price Area 6					
Dist. 16: No. Colorado	2.73	2.62	2.67	2.6312	7.53
Dist. 17: West. and So. Colorado — No. New Mexico	2.64	2.62	2.74	2.8420	7.56
Dist. 18: Arizona-New Mexico	2.98	3.21	3.28	3.7093	55.74
Price Area 6 Average	2.70	2.66	2.76	2.8367	9.78
Minimum Price Area 7					
Dist. 19: Wyo., Idaho	$1.97	$1.96	$2.07	2.0339	4.22
Dist. 20: Utah	2.46	2.29	2.29	2.2811	−18.80
Price Area 7 Average	2.18	2.08	2.15	2.1270	−4.21
Minimum Price Area 9					
Dist. 22: Montana	1.43	1.30	1.40	1.5034	1.83
Minimum Price Area 10					
Dist. 23: Wash., Oregon	3.19	3.15	3.36	3.5211	29.64
Grand Total	$2.06	$2.01	$2.13	$2.1947	10.63c.

District, sitting at St. Louis, had completely upheld the Division's ruling that the Coal Act prohibits code members producers from allowing discounts from minimum prices in selling coal to any cooperative organizations which grant patronage dividends to their members, except bonafide farmers' cooperatives which are registered by the Division and the registered intervening agencies that purchase coal in behalf of such farmers' cooperatives.

•

Solid Fuels Industry Board Named by Ickes

An Industry Committee on Solid Fuels "to advise on the coordination of the nation's fuel supply and to meet war-time needs" was appointed Feb. 11 by Secretary of the Interior Ickes. The committee was formed, Mr. Ickes said, in compliance with the President's request that steps be taken to assure an adequate supply of solid fuels where and when needed.

The group just named represents the coal industry, transportation and mine labor. Mr. Ickes said other members will be named to represent the public interest. Industry appointees named are:

Bituminous Coal Producers—George W. Reed, vice president, Peabody Coal Co.; Charles O'Neill, Barnes & Tucker Co.; H. T. DeBardeleben, president, DeBardeleben Coal Corporation, and O. L. Alexander, president, Pocahontas Fuel Corporation.

Anthracite Operators—Charles Huber, chairman of the board, Glen Alden Coal Co.; James H. Pierce, president, East Bear Ridge Colliery Co.

Coke—D. M. Rugg, vice president, Koppers Co.

Wholesale Distributors—H. C. Rogers, sales manager, Hickman & Williams Co., Cincinnati, Ohio.

Retail Distributors—James L. Newbold, Malcolmson Coal Co., Detroit, Mich.

Tidewater Dock Operators—R. L. Bowditch, president, C. H. Sprague & Son, Boston, Mass.

Great Lake Dock Operators—John A. Maher, manager, Mayer Coal Bureau, St. Paul, Minn.

Railroad Transportation—J. J. Pelley, president, Association of American Railroads.

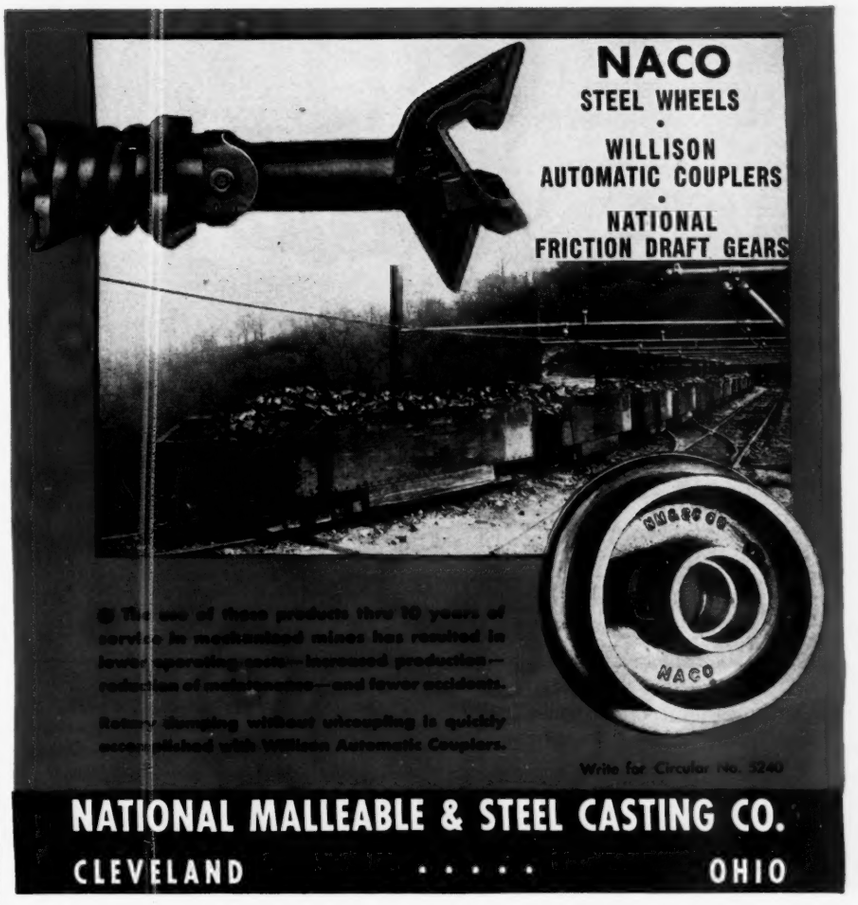
Transportation Other Than Railroad—Lachlan Macleay, president, Mississippi Valley Association.

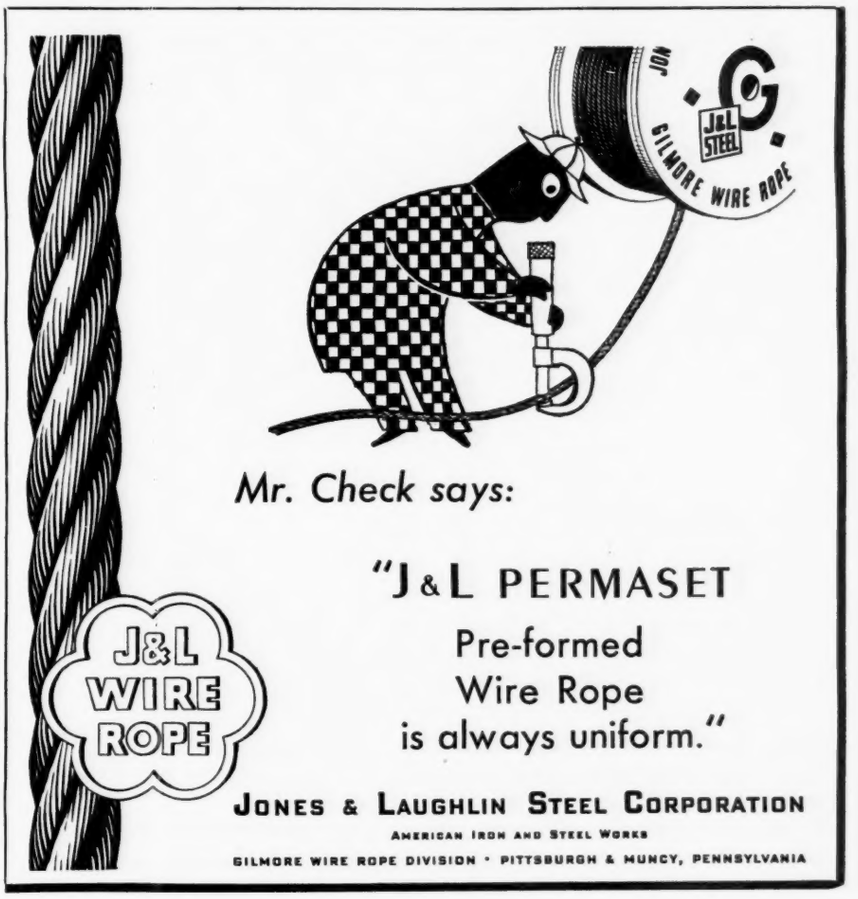
Mine Labor—Percy Tetlow, technical adviser, United Mine Workers, and Thomas Kennedy, secretary-treasurer, United Mine Workers.

•

Will Partly Mechanize Mine

Planning partial mechanization of the Jeanne Francis mine, Letcher, Ky., the Jeanne Francis Coal Co. has ordered from the Goodman Mfg. Co. shaker conveyors, automatic duckbills and other devices. This company, recently organized and having main office at Columbus, Ohio, purchased the property, known as the Marian Coal Co., from the Kentucky River Coal Corporation and, after extensive repairs, placed the property in operation in mid-September last.





OEM photo

Nelson Stresses Conversion

Donald M. Nelson, chairman, War Production Board, addressing the National Conference of Business Paper Editors, Feb. 13, on the important role that conversion of industrial facilities must play in arming the nation. Representatives of the McGraw-Hill mining publications present included H. W. Clarke, publisher; H. C. Parmelee, editor, *Engineering & Mining Journal*; and Ivan A. Given, associate editor, *Coal Age*.

Mining Industry Pledges Support In Nation's War Program

Complete support of the mining industry to the government and the nation's war program was pledged at the 44th annual meeting of the American Mining Congress, held Feb. 6 in Cleveland, Ohio, in the following statement of policy:

"The American Mining Congress, assembled at Cleveland, Ohio, upon the 6th day of February, 1942, pledges its complete cooperation to the task of carrying the War to a successful conclusion. Minerals are of such vital necessity that we urge full recognition by management, labor and stockholders of the responsibility which each must accept in order that maximum production be obtained.

"New and high-cost mineral production must be encouraged. The government has assumed responsibility for the methods by which this shall be done. The mining industry, whatever its views as to the effectiveness of the methods, will assist to the fullest extent. Production for war needs is of first importance. To this end the mining industry reaffirms its position on the necessity of equitable employee-employer relationship, sound fiscal policies, the elimination of non-essential government expenditures, and other matters which are essential to the successful prosecution of the War and the preservation of our American way of life. The mining industry pledges itself to work and produce for victory."

A feature of the meeting was an address by John H. Martin, special assistant to J. S. Knowlton, head of the Division of Industry Operations of the War Production Board. This was followed by reports on the work of the last year and general discussion of tasks which the mining industries—coal, metals and nonmetallic minerals—now face in supplying every possible pound of the minerals needed for war production.

Howard I. Young, president, American Zinc, Lead & Smelting Co., was reelected president. Other officers elected were: first vice president, D. D. Moffat, vice president, Utah Copper Co.; second vice president, Donald A. Callahan, president, Lexington Mining Co.; third vice president, James D. Francis, president, Island Creek Coal Co.; secretary, Julian D. Conover. Directors elected for three years included William J. Jenkins, president, Consolidated Coal Co., and Mr. Francis.

•

Safety Instructors Sought By Bureau of Mines

The U. S. Civil Service Commission has announced that it is recruiting safety instructors for positions in the U. S. Bureau of Mines. The salary is $1,800 a year. Appointments will be made in the fields of coal and metal mining, quarrying, tunneling, and petroleum. All applications for the written general test must be on file with the Commission, Washington, D. C., not later than March 30.

Two years' experience is required in a responsible position such as mine or section foreman, shift or fire boss, or safety inspector or engineer in the mining or petroleum industries. Before persons can be appointed from the employment lists established as a result of the examination they must possess either a Bureau of Mines first-aid or mine-rescue certificate. Applicants must be between 25 and 35 years of age and must meet certain rigid physical standards.

The duties of these positions include instructing classes in first aid, accident prevention, and in the use of gas masks. Addressing safety meetings and assisting with first-aid contests also may be part of the work. Instructors are subject to call at any time to help with rescue and recovery work following disasters. They also will assist in investigating the causes of disasters.

Copies of the announcement and application forms may be obtained at first-aid second-class post offices or from the Civil Service Commission, Washington, D. C.

New Priority Forms Brought Out: Equipment Ceilings Set

Applications for individual preference ratings may be filed on the new PD-1A blanks according to Priorities Regulation No. 3, issued last month. Preference ratings assigned on Army and Navy contracts may now be issued on Form PD-3A. After March 1, all preference ratings must be assigned on these new forms. For PD-1A, however, may not be used to apply for a preference rating for plant expansion or construction.

Preference ratings assigned on Forms PD-1A and PD-3A may be extended by indorsing on the purchase order the form of certification prescribed on each form. Extension of preference ratings is restricted to deliveries of material to be physically incorporated into material to be delivered ultimately to the original recipient of the preference rating, or to replace in inventory material delivered on orders rated under preference rating certificates.

Form PD-1A may be reproduced in blank by or for the user; Form PD-3A may not be reproduced. Form PD-1A may be obtained from the Director of Priorities, Washington, D. C., or any of the Priorities Field Offices.

Price ceilings were imposed on several additional types of materials and equipment used at coal mines in February by OPA. Denver, Colo., was added to the list of basing points included in the relaying rail schedule, No. 45. The ceiling on relaying rail purchased on the basing-point basis has been revised so that it need not be less than $24 per gross ton in any case. The warehouse ceiling on carload lots of relaying rail has been lowered from $32 per net ton to $32 per gross ton, with provision for an additional charge for reconditioning extras and a commission of $1 a gross ton to a purchaser's agent.

Formal ceilings on wire, cable and cable accessories were established at Oct. 15, 1941.

Coming Meetings

- Canadian Institute of Mining and Metallurgy: annual meeting, March 9-11, Royal York Hotel, Toronto, Ont., Can.
- American Society of Mechanical Engineers: spring meeting, March 23-25, Rice Hotel, Houston, Texas.
- Utah Coal Operators' Association: annual meeting, April 1, Tribune-Telegram Building, Salt Lake City, Utah.
- Virginia Coal Operators' Association: annual meeting, April 11, Norton, Va.
- American Mining Congress: coal convention and exposition, April 27-May 1, Music Hall, Cincinnati, Ohio.
- Mine Inspectors' Institute of America: annual convention, May 25-27, Lafayette Hotel, Lexington, Ky.
- Illinois Mining Institute: 24th annual boat trip and summer meeting on Str. "Golden Eagle," leaving St. Louis, Mo., June 5; returning June 7.
- Rocky Mountain Coal Mining Institute: annual meeting, June 10, 11 and 12, Hotel Utah, Salt Lake City, Utah.

for Want of an OIL CAN— PRODUCTION WAS LOST

★ A wire rope is really a machine that has many working parts. As the wire rope travels or bends, these parts (wires) move against each other with the result that in a single wire rope there are thousands of wearing surfaces. These wearing surfaces need a protecting film of oil. However, only the right kind of lubricant, properly applied, will provide the needed protection to both the surface and the inner wires.

Lubrication at proper intervals and with the *right* kind of wire rope lubricant will accomplish five things . . . Prevent corrosion . . . Maintain wire rope safety . . . Give your rope longer life . . . Reduce wear on drums and sheaves . . . Increase your operating efficiency. For detailed information regarding the wire rope lubricant exactly suited to your equipment and operating conditions, consult your nearest Hazard Wire Rope representative.

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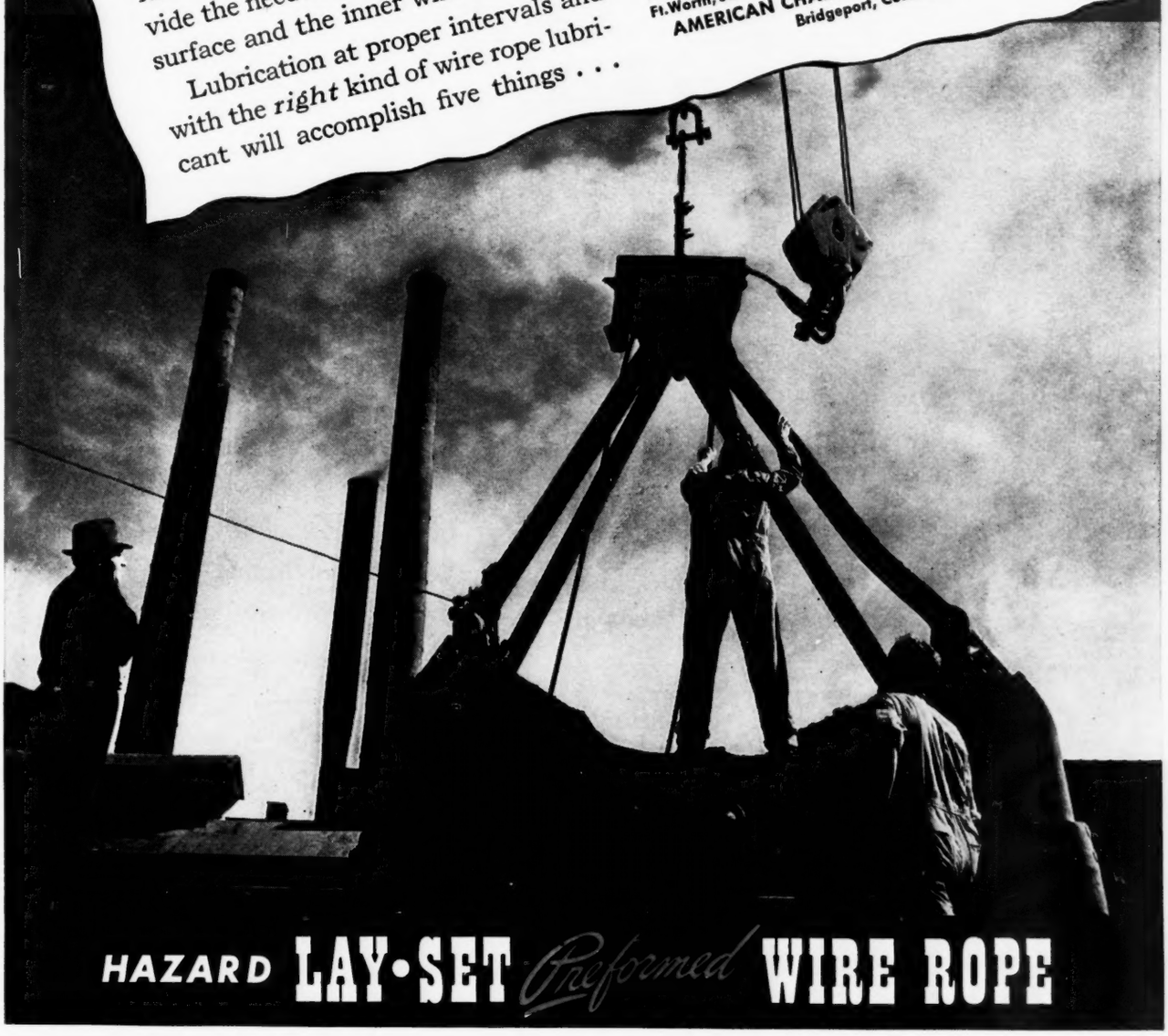

HAZARD LAY-SET *Preformed* WIRE ROPE

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. . . Says Mr. John M. Weed, Superintendent of McAlester Fuel Company's Sandow Mine at Rockdale, Texas.

Note this "Roll Call" of Catalogers

The 1941 COAL MINING CATALOGS had 40% more BUYING information than the 1940 Edition. These companies are giving Mining Men the added buying information they request.

●

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Carnegie-Illinois Steel Corp.
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levels in Schedule No. 82, issued Jan. 30. Schedule No. 105, issued Feb. 12, established similar ceilings on gears, pinions, sprockets and speed reducers.

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New Rail Equipment Installed Highest Since 1929

New freight cars put in service last year by Class I railroads totaled 80,502, the largest number installed in any year since 1929, according to the Association of American Railroads. This was an increase of 14,957 over the total for the preceding year and compared with 84,894 in 1929. New cars put in service last year included 30,938 coal, 44,807 box, 1,752 flat, 2,200 refrigerator, 149 stock, and 656 miscellaneous cars.

Class I roads had on order on Jan. 1 of this year 74,897 new cars, comprising 23,638 coal, 46,300 box, 1,400 refrigerator, 2,191 flat, 300 stock, and 1,068 miscellaneous cars. This is the largest number on order at the beginning of any year since compilation of

Keeping Step With Coal Demand

Bituminous Coal Stocks

Thousands

	Net Tons Jan. 1 1942	P.C. Change From Dec. 1 1941	P.C. Change From Jan. 1 1941
Electric power utilities	12,821	+3.2	+13.1
Byproduct coke ovens	8,901	+6.9	−12.6
Steel and rolling mills	968	+6.6	+17.0
Railroads (Class 1)	10,235	+5.2	+72.8
Other industrials*	20,472	−0.7	+39.1
Total	53,397	+2.7	+24.2

Bituminous Coal Consumption

Thousands

	Net Tons Dec. 1941	P.C. Change From Nov. 1941	P.C. Change From Dec. 1940
Electric power utilities	5,916	+6.9	+24.9
Byproduct coke ovens	7,352	+7.4	+ 5.0
Steel and rolling mills	984	+7.9	+ 1.0
Railroads (Class 1)	9,226	+5.5	+14.1
Other industrials*	13,738	+9.8	+15.9
Total	37,216	+7.7	+14.0

*Includes beehive ovens, coal-gas retorts and cement mills.

Coal Production

Bituminous

Month of January, 1942, net tons	48,540,000
P.c. increase over January, 1941	10.1

Anthracite

Month of January, 1942, net tons	4,532,000
P.c. decrease from January, 1941	9.8

Sales of Domestic Coal Stokers Vs. Oil Burners

	Coal Stokers	Oil Burners
December, 1941	8,303	14,569
P.c. change from Dec., 1940	+31.2	+29.6
January-December, 1941	188,766	198,441
P.c. change from Jan.-Dec., 1940	+25.1	+0.35

Index of Business Activity*

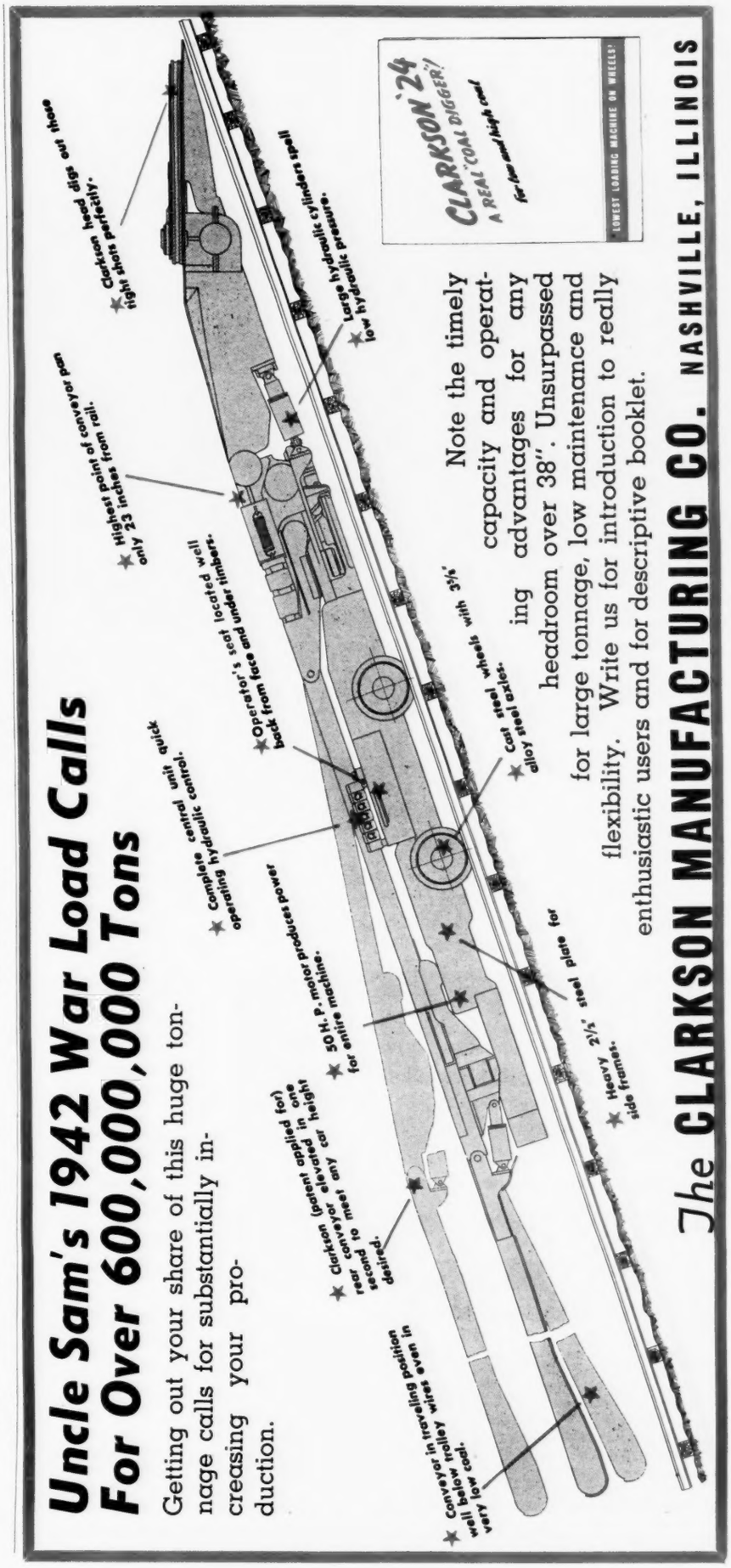
Week ended Feb. 7 (preliminary)	171.0
Percent change from month ago	+ 4.8
Percent change from year ago	+16.8

Business Week, Feb. 14.

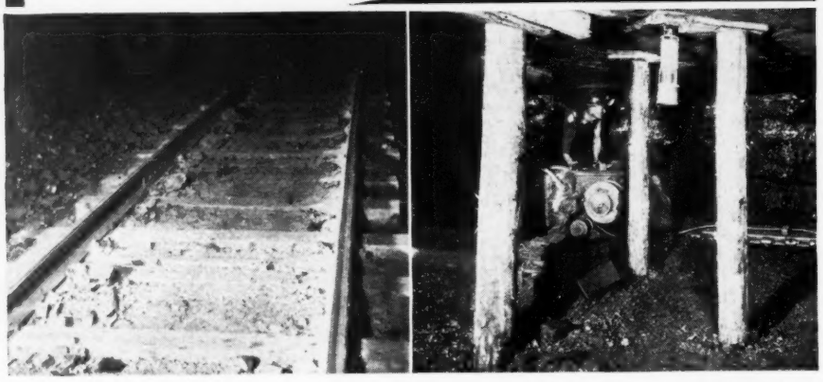
Electrical Power Output†

Week ended Feb. 7, kw.-hr.	3,474,638,000
Percent change from month ago	+0.06
Percent change from year ago	+16.2

†Edison Electric Institute.


Uncle Sam's 1942 War Load Calls For Over 600,000,000 Tons
Getting out your share of this huge tonnage calls for substantially increasing your production.
Clarkson head digs out those tight shots perfectly.
Highest point of conveyor pan only 23 inches from rail.
Operator's seat located well back from face and under timbers.
Complete control unit quick operating hydraulic control.
Large hydraulic cylinders spell low hydraulic pressure.
Cast steel wheels with 3½" alloy steel axles.
50 H. P. motor produces power for entire machine.
Clarkson (patent applied for) rear conveyor elevated in one second to meet any car height desired.
Heavy 2½" steel plate for side frames.
Conveyor in traveling position well below trolley wires even in very low coal.
CLARKSON '24
A REAL COAL DIGGER!
For low and high coal
LOWEST LOADING MACHINE ON WHEELS!
Note the timely capacity and operating advantages for any headroom over 38". Unsurpassed for large tonnage, low maintenance and flexibility. Write us for introduction to really enthusiastic users and for descriptive booklet.
The CLARKSON MANUFACTURING CO. NASHVILLE, ILLINOIS

PHYSICALLY FIT
FOR MORE YEARS OF SERVICE



(Left) Osmose-treated oak ties in haulage way of Clover Fork Coal Co. Mine, Kitts, Ky. (Right) Posts, caps, wedges Osmose-treated in Alabama Mine, give 3 to 5 times longer service.

How Osmose-Treated Mine Ties and Timbers cut maintenance and replacement costs

Mining companies throughout the country are using Osmose-treated ties and timbers because they have a service life three to five times longer than untreated timbers thus cutting maintenance and replacement costs 300 to 500%. Easy to apply by dipping or brushing, Osmosalts penetrate into the wood forming a deep zone of protection that resists wood decay and prevents rot. Because Osmose-treated timbers keep their original strength, they provide additional safety by helping to prevent serious, costly accidents that often result from untreated decaying timbers. Our field engineers are available, for consultation on your wood-preserving problems. Ask for his services.

Why
OSMOSE PROTECTION PAYS

1. PERMITS the use of any species of fresh cut native timber locally obtained. Requires no waiting for seasoning.

2. PROVIDES 3 to 5 times longer service life over untreated timber because Osmosalts penetrate deeply into the wood.

3. ELIMINATES capital investment in treating equipment and also does away with transportation charges to and from pressure treating plants.

4. ENABLES you to treat your own timber with unskilled labor by simply brushing or dipping.

OSMOSE
WOOD PRESERVING COMPANY
OF AMERICA INCORPORATED
General Offices: Buffalo, N. Y.—Branch Offices: Birmingham, Ala.; Denver, Colo.; Harlan, Ky.; Kenova, W. Va.

FOR MORE POWER AT THE FACE
USE MESCO
Flash Welded
RAIL BONDS

It's power at the face that counts—and Mosebach Bonds will help you get plenty of it! They are manufactured by the patented Flashweld Process, which gives stronger, more oxygen-free welds at the terminals, resulting in lower resistance and longer bond life. Flashweld Bonds are made in 16 different styles—one to solve every bonding problem. Write for complete details.

M8-F FLASHWELD BOND
Large welding area for permanent work. For temporary use this bond can be welded on ends of lugs only, then easily removed and re-used many times.

MOSEBACH
ELECTRIC & SUPPLY COMPANY
1115 Arlington Ave., Pittsburgh, Pa.
Distributors in all Coal Centers

New locomotives placed in service in 1941 by Class I carriers totaled 633, of which 161 were steam and 472 were electric and diesel. This was the largest number installed since 1930, comparing with 419 new locomotives placed in service in 1940, of which 126 were steam and 293 electric and diesel.

There were 546 new locomotives on order Jan. 1, 1942, including 258 steam and 288 electric and diesel. A year previous there were 206 on order, of which 115 were steam and 91 were electric and diesel.

•

Miners Seek Adjustment On War-Time Wages

A 95 percent representation of the mine locals of Subdistrict 12, United Mine Workers (Illinois), met Feb. 1 in Herrin to plan a drive for war-time wage adjustment. A resolution was passed, which the various locals are asked to ratify as the initial move. It is proposed to canvass all miners' unions in the United States. The resolution follows:

"We, the undersigned, being representatives of local unions of the United Mine Workers of America, are resolved this..... day of February, 1942, that the wage scale of our present contract under which we are working is both inadequate and inconsistent with the abnormal conditions prevailing under the war-time economy of our nation. Our present contract was negotiated before the entrance of our country into war, before the abnormal rise of all consumer products, and before the increase of taxes made necessary in order to successfully perpetuate our final victory in the war. We do hereby petition you to negotiate for us a fair and just increase in our scale of wages."

•

New Illinois Rescue Station

The Department of Mines and Minerals of Illinois has provided a new mine-rescue station in Herrin for the southern six counties of the State. John Rushing has been appointed superintendent. The rescue team, consisting of Clyde Taylor, George Cravens, Joe Oliver, Arthur Gottard and Henry Basinger, is subject to emergency calls 24 hours a day to any part of the State.

•

E. E. Eizemeyer Dies

Edwin E. Eizemeyer, 48, American Pulverizer Co., St. Louis, Mo., died suddenly of heart disease at his home in that city on Feb. 22.

•

New Preparation Facilities

JOHNSTOWN COAL & COKE CO., Portage No. 4 Mine, Portage, Pa.—Contract closed with Kanawha Mfg. Co. for screening, conveying and washing equipment to prepare nut and stove sizes; washing unit is Kanawha Belknap washer of 60 tons per hour capacity.

NEW RIVER CO., Summerlee Mine, Summerlee, W. Va.—Contract closed with Kanawha Mfg. Co. for rescreening, washing and reassembling plant to handle 200 tons per hour of 0x2½-in. coal, with Jeffrey dia-

"GULF QUALITY LUBRICANTS ARE GOOD INSURANCE against mechanical delays"

Says cleaning plant Superintendent

Actual photo of Gulf engineer (*right*) consulting with cleaning plant superintendent on lubrication of size screen eccentrics. Gulf H. M. Grease keeps this important equipment running efficiently day in and day out.

"A shutdown at any unit of equipment means a plant shutdown — so we can't take chances with our lubrication."

"THE sound lubrication policy we adopted when this plant was placed in operation three years ago is paying us dividends," says this cleaning plant Superintendent. "By sticking to the practical lubrication recommendations of a Gulf engineer, we keep all our equipment operating continuously, without delays caused by mechanical troubles. Result: We are able to keep pace with wartime production demands to the fullest possible extent."

Users of Gulf lubricants get two big advantages: First, a Gulf lubrication engineer recommends the right oil or grease for each particular requirement—recommendations which are based on thorough training and broad experience with all types of coal mining and coal cleaning equipment. Second, they're *sure* of getting lubricants exactly suited to each moving part—because with over 400 quality oils and greases included in the Gulf line, a Gulf engineer never needs to compromise in the selection of lubricants.

Let a Gulf engineer point out to you the possibilities for improvement in *your* lubrication practice. He can help you get full capacity performance from your equipment and lower operating costs. The services of a Gulf engineer—and the complete line of Gulf quality lubricants—are quickly available through 1200 warehouses in 30 states from Maine to New Mexico. Write or 'phone your nearest Gulf office today.

GULF INDUSTRIAL LUBRICATION

GULF OIL CORPORATION
GULF REFINING COMPANY | **Gulf Building, Pittsburgh, Pa.**

For smooth, quiet drives
The continuous wedging action of the De Laval worm gear transmits power without vibration, shock or noise. • Three or more teeth are always in contact, resulting in an even flow of torque and great strength. • Both motor and driven machine are saved the impact of gear or sprocket teeth. Frequently the product is improved or the machine can be speeded up because of the absolutely uniform motion. Operatives do more and better work when not annoyed by noise and vibration. Describe requirements and ask for Publication W-1129.
specify
DE LAVAL
WORM GEARS
De Laval worm gear driving picking tables and loading booms in Maiden Mine of the Kelly's Creek Colliery Co
DE LAVAL
WORM GEAR DIVISION
of the De Laval Steam Turbine Co., Trenton, N. J.
MANUFACTURERS OF TURBINES STEAM HYDRAULIC PUMPS CENTRIFUGAL PROPELLER ROTARY DISPLACEMENT MOTOR MOUNTED MIXED FLOW CLOGLESS SELF PRIMING CENTRIFUGAL BLOWERS and COMPRESSORS GEARS WORM HELICAL and FLEXIBLE COUPLINGS

phragm jig to wash 2½x⅝-in.; complete with necessary auxiliary screening and conveying equipment; all housed in steel structure.

NEW RIVER Co., Lochgelly Mine, Lochgelly, W. Va.—Contract closed with Kanawha Mfg. Co. for rescreening, washing and reassembling plant to handle 200 tons per hour of 0x2½-in. coal, with Jeffrey diaphragm jig to wash 2½x⅝-in.; complete with necessary auxiliary screening and conveying equipment; all housed in steel structure.

NEW RIVER Co., Mount Hope, W. Va.—Contract closed with Roberts & Schaefer Co. for Hydro-Separator coal-washing equipment to be built in existing tipple; capacity, 150 tons per hour of 0x2½-in. coal; to be completed April 15.

REPUBLIC STEEL CORPORATION, Sayreton, Ala.—Contract closed with Jeffrey Mfg. Co. for washery additions to clean 60 tons per hour of mine-run.

WESTMORELAND MINING Co., Blairsville, Pa.—Contract closed with Jeffrey Mfg. Co. for two-compartment diaphragm jig; capacity, 120 tons per hour of ⅜x4-in. coal.

B.C.C. 25 Years Old

The Bituminous Casualty Corporation, Rock Island, Ill., and its predecessor organization under the same management are this year celebrating their 25th year of service to industry in workmen's compensation, public liability, property damage and elevator insurance. H. H. Cleaveland and H. W. Cozad organized Bituminous Casualty in 1917, when the Illinois Compensation Act became compulsory for certain industries. Mr. Cozad was active head until his death in 1936, whereupon Mr. Cleaveland took over and continues as president and chairman of the board of directors.

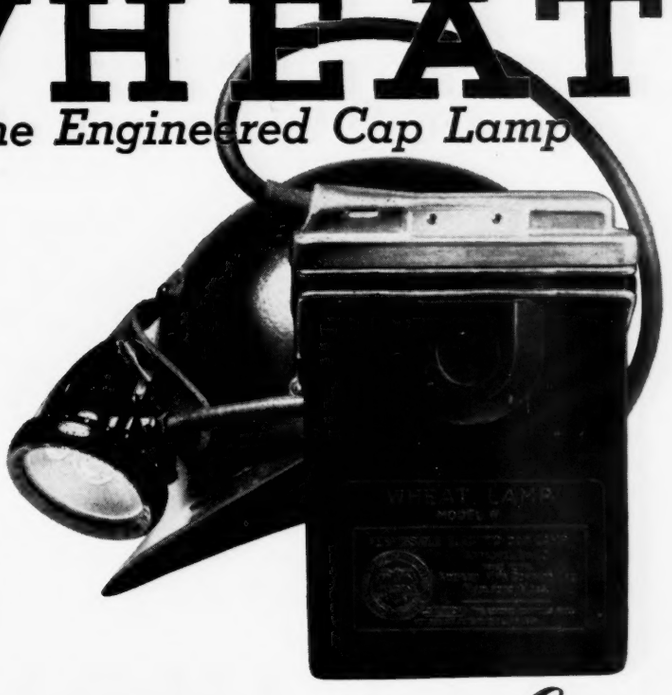
The first policy was issued effective July 1, 1917, and the July 1, 1919, report showed total assets of $142,449 with surplus to the stockholders of $109,985. Today, the company announces, assets exceed $9,000,000 and surplus to stockholders, including voluntary contingency reserves, is $1,768,000. The company stresses that it has written compensation rather freely and has handled risks that most companies would avoid, but "the underwriting has been conservative and a service organization built up which has made it possible to handle these risks successfully. In building up the service engineering department, Bituminous Casualty has, wherever possible, engaged technical school graduates or men whose experience and training have given them approximately the same qualifications. . . .

"The company has at all times attempted to keep ahead of the problems to be met in its particular lines. From the standpoint of underwriting this has consisted principally in gathering all the necessary data for experience rating of risks impartially prior to the establishment of the various rating bureaus in the different states. Bituminous Casualty still operates in some open states and its experience rating system is still in effect. In those states where rates are made by the various bureaus, the company maintains a complete statistical department for its underwriting information." It also offers complete service to policyholders in the elimination of hazards of various types.

the swing is to

WHEAT

The Engineered Cap Lamp



12 *Reasons why*

1 Two bulbs (one for emergencies) — miner is never in the dark.

2 Center mounted, Krypton-filled bulb, gives 20% more light — no dark "shadow spot" in beam.

3 Choice of 3 reflectors gives narrow concentrated beam, a medium beam, or a widespread beam of light — suits all working conditions.

4 Headpiece weighs less than 6 ounces, Lamp Cord 6 ounces, Battery 62 ounces — Total weight of Lamp complete 74 ounces.

5 Headpiece molded of strong bakelite; sealed, moisture-proof and dust-proof.

6 Rubber battery case — non-conductor of electricity — a valuable safety feature.

7 Battery solution (free) limited to one ounce total both cells.

8 Lead-acid type battery maintains high voltage throughout shift (80+% efficiency) — year after year.

9 Battery charged through headpiece and cord of cap lamp — a daily test of all connections.

10 Designed for self-service charging system for lowest lamp-house operating cost.

11 To charge, headpiece is simply slipped on to key in charging rack, and turned to make contact. Nothing to take apart — unit-sealed construction.

12 A payment plan (purchase or rental) to meet the requirements of companies — large and small.

Note — More New Wheat Cap Lamps were installed in the U.S.A. during 1940-1941 than in any previous 2-year period

Write today—

WHEAT LAMP SALES, INC.

1501 Kanawha Valley Bldg., Charleston, W. Va.

SPECIALISTS IN MINE LIGHTING FOR 25 YEARS

KOEHLER MFG. CO.

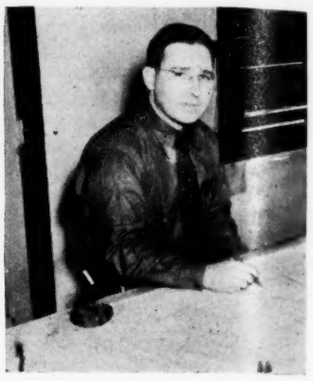
Marlboro · · · Mass.

COAL MEN ON THE JOB

J. L. ("Lew") Willets, mine foreman (left), and George N. McLallen, superintendent.

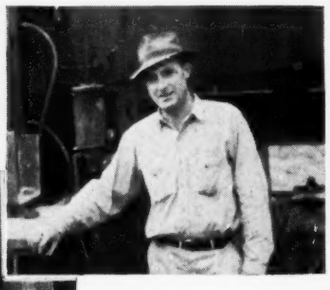
Samuel Reese, assistant maintenance foreman; G. L. Kemp, maintenance foreman, and William Keeney, night mine foreman.

George N. Rigg, chief engineer.



Thomas King, safety engineer.

Left to right: Matthew Hall, Grover Dugan and George Hibner, firebosses.



John Noon
coke-plant foreman.

Left-hand row: Leo Stock, Frank Smodic and Bryan Houston, section foremen; second row: Vincent McArdle, section foreman; third row: John Roberts and John Sopkovich Sr., section foremen, with George N. McLellan, superintendent.

Seated: William Wilson Jr., transportation boss; Joseph Maraney and Ralph Keck, section foremen; standing: J. Hobbs, A. Kravec, N. Thomas, A. Grimm, section foremen.

Roy Dayton Jr. and Peter Serinko, assistant mine foremen.

Office staff: L. E. Kemp, chief clerk; Bob Sutton, Grover Dils, Jim Boylan and Paul Sheahan, compensation and payroll clerk.

W. D. Heller (right), master mechanic; John Novak, chief outside electrician; William Cappozzoli, asst. maintenance foreman; John Millice, shop foreman.

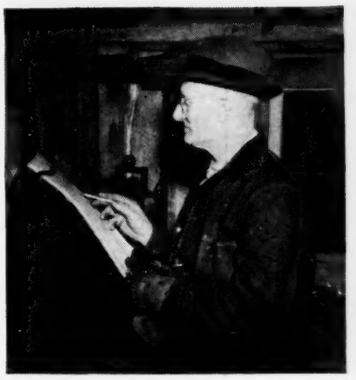
Left to right: John Novotny, Albert E. Bernadella and Morris Holliday, section foremen; J. L. Willetts, mine foreman; Elmer Perrine, Thomas Lally and James West, section foremen.

Isabella (Pa.) Mine
Weirton Coal Co.

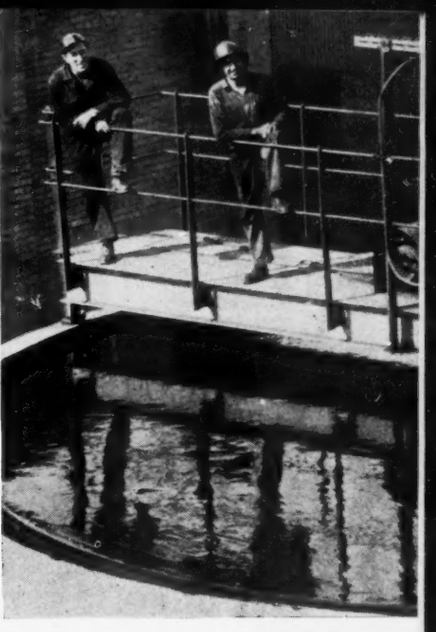
BY EDITORS ON THE JOB

J. L. Bogess, president, Willard Coal Corporation, Willard, Ky.

L. W. Bolton, tipple foreman, Regal mine, Southern Collieries, Inc., Lake City, Tenn.



C. R. Bowling, vice president and mine foreman, Willard Coal Corporation, Willard, Ky.



Harry L. Vincent, cleaning plant supervisor, Consolidation Coal Co., Fairmont, W. Va., with Arch Ashcroft foreman, No. 32 plant, Owings, W. Va.

Peter M. McAvity (left), S. L. Watson, coal inspector, Consolidation Coal Co.; and J. E. Knight, night foreman, No. 32 preparation plant, Owings, W. Va.

J. O. Seese (left), general foreman, and A. B. Crichton Jr., superintendent, Logan No. 4 mine, Johnstown Coal & Coke Co., Beaverdale, Pa.

E. G. Cassell (fourth from left), electrical construction foreman, Consolidation Coal Co., Fairmont, W. Va., with some of his crew.

H. H. Wagner (left), chief electrician, and H. T. Sipe, mine foreman, No. 2 mine, Cambria Fuel Co., Holsopple, Pa.

Left to right: M. E. Gordon, section foreman; Freeman Echols, mine foreman; M. D. Hall, section foreman; and R. A. Poland, manager, Frances Fuel Co., Monongah, W. Va.

H. M. Mahoney (left), superintendent, Sun Coal Co., Careyville, Tenn., with G. H. Kirby, vice president, Cambria Coal Co.

Part of No. 32 mine shop staff, Consolidation Coal Co., Owings, W. Va., including Paul H. Stewart, maintenance foreman (kneeling, left); Homer Payne, supply clerk; Duff Randall, car-shop foreman; and Jimmy McRay, maintenance clerk.

Left: J. R. Miller, Tennessee district inspector, with R. Y. Wert, superintendent, Cross Mountain mine, Cambria Coal Co., Briceville, Tenn.

25 Years of Progress

BITUMINOUS CASUALTY CORP. 1917 25th ANNIVERSARY 1942

FOR 25 YEARS the Bituminous Casualty Corporation has grown and expanded, until today they are one of the largest agency companies in America specializing in Workmen's Compensation, Public Liability and Property Damage coverages.

Assets now exceed $9,000,000.00 with reinsurance of $1,000,000.00 in excess of $20,000.00 compensation, and our safety engineering and claim services are second to none.

Bituminous Casualty now operates in 20 states and has claim offices in each one of them for better claim service to policyholders.

Bituminous Casualty offers more profit for you in 1942. Investigate today—a postal card will do the trick.

BITUMINOUS CASUALTY CORPORATION
ROCK ISLAND ILLINOIS

Mining, Utilization, Safety and Education Covered in Broad A.I.M.E. Program

METHODICAL research, some institutional and some corporational, brought at least five papers to the annual meeting of the American Institute of Mining and Metallurgical Engineers held in New York, Feb. 9 to 11. These were: (1) Determination of a simple way of changing the characteristics of a coal, while feeding it into a stoker, so that when it burns in the furnace it will not melt, coke and form unmanageable coke trees; (2) tests on the suppression of coal dust; (3) studies into the safe operation of diesel locomotives; (4) detailed observations into the life span of treated and untreated mine timber, and (5) the imaginary byproduct tree, so often depicted, which, stemming from coal, provides a host of products that modern civilization regards almost as necessities. Mining subjects, such as loading, hauling (including shuttle cars), hoisting, ventilation and training of men (especially in fuel technology), also received attention.

How to Burn Coking Coal in a Stoker—Almost all the bituminous coal mined in Pennsylvania will coke. Thus, when it gets in an underfeed stoker, it forms "coke trees," columns of coke standing up above the fuel bed, which defect, declared A. W. Gauger, director, mineral industries research, Pennsylvania State College, for his associates, C. C. Wright and T. S. Spicer, can be met by preparing, or processing, the coal for combustion either before its delivery to the furnace or preferably in the short interval during which the coal is being fed to the retort by a vertical screw located under the fire hopper. A tuyere placed at a low level admits lightly compressed air below the retort, and a vertical screw is used, which, while it reduces segregation of sizes, also mixes the air with the coal. This screw, though an important part of the construction, is not a new feature, but was not incorporated in the stoker shown in Fig. 1.

As the temperature at the top of the vertical screw in two cases has been found to be only 110 and 350 deg. C., respectively, the air is hot enough only to oxidize the coal but not to cause it to burn or coke. Because of this preoxidation, or preconditioning, as it is termed, the coal, on reaching the furnace, is deprived of its power to form coke much as is coal that has stood out in the weather for a long time.

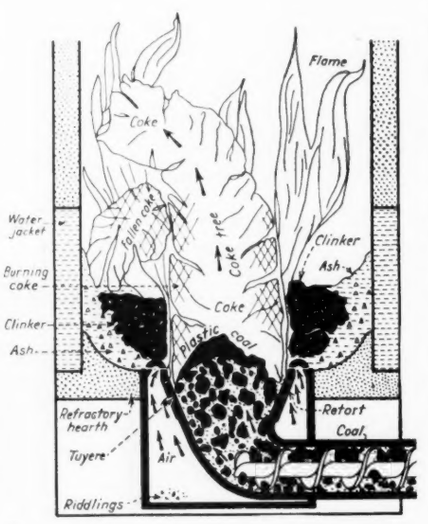


Fig. 1—Underfeed stoker burning a coking coal. Note formation of big coke tree.

The operation of the stoker accordingly is not impeded, even where, before preoxidation in the same type of stoker, large coke trees were formed and also a gooey mass which prevented the air from being distributed uniformly through the fuel bed, thus causing the fuel to burn slowly, to respond tardily to the demand for heat, and finally, in extreme cases, to refuse to burn at all. This stoker has been given a test in a State College home and proved its ability to meet all demands—rapid combustion, quick recovery from a banked to an active condition and freedom from any tendency for the fire to go out.

Should Dustiness Be Measured by Counting?—In experimental work involving many variables, it is doubtful whether any individual sample is sufficiently representative to justify the accuracy possible when making a microscopic dust count, declared G. R. Gardner, research chemist, Pittsburgh Coal Co., speaking for himself and D. H. Davis, chief chemist. He quoted tests that proved that the photometric method could be made to duplicate with reasonable closeness the microscopic count. The U. S. Bureau of Mines midget impinger was used for collecting the air-borne dust.

Mine Dust Determinates

Dust thrown into the air by coal cutting was the subject of the study being made by the Pittsburgh Coal Co. It has been found that dust concentration varies greatly from mine to mine and even in the same mine, this being due probably to at least nine causes: (1) bed moisture and drainage, (2) ventilation, (3) cutting speed, (4) bit condition and setting, (5) type of cut, (6) method of cleaning cut, (7) clay spars and sulphur balls, etc., (8) clay or rock strata underlying coal and included in cut and (9) type of mining.

Single Spray Cuts Dust 93 Percent—The best result was obtained with a fishtail spray located on the entering side of the chain near the front of the machine and directed along the cutter chain as it enters the kerf.

With 0.45 gal. of water per minute at a pressure of 35 lb. per square inch, with an average cutting speed of 1.4 ft. per minute and with average weight of cuttings produced of 2.75 lb. per minute, this gave a reduction of dust of 93 percent. A pencil-like jet in this same position and a fishtail spray in a like position but on the other side of the cutter bar together reduced the dust 96 percent. High pressures, the authors say, are not essential for good dust reduction. "Use of a low-viscosity oil in the spray was found to prevent the binding of stud bolts and in addition aided in the reduction of dust."

The low-viscosity oil which forms a stable oil-in-water emulsion at dilute concentrations appeared to have the property of inhibiting

the corrosion resulting from use of sprays. Corrosion occurred with two wetting agents and with water. Even after several days' operation sufficient corrosion had occurred to cause delays in the changing of bits.

Shuttle-Car Characteristics—Shuttle cars, declared J. V. McKenna, State mine inspector, Waynesburg, Pa., range in over-all height from 32 to 48 in. and in their capacity from 2½ to 6 tons. Travel speed of battery-operated shuttle cars is about 5 miles per hour empty and 3½ miles loaded, and their weights, including batteries, range from 10,800 to 13,200 lb. Aggregate weight of the two units of a battery is 4,656 lb. Each unit has 24 cells of 13 plates.

Danger From "Pesky" Doors

As each shuttle car has only one operative, he must get on and off twice whenever a door has to be opened and passed, and this is likely to make him disposed to leave a door open and take a chance with the ventilation. However, Mr. McKenna felt assured that doors should be used instead of canvas checks, because the latter are not tight and may be easily torn down. An air circulation with a definitely defined course, properly controlled and completely locked, should be provided, so that the opening of a single door will fail to cause a short circuit of the ventilating system. Use of auxiliary blowers and tubing should, he declared, be prohibited, as they indicate a weakness in the ventilating provisions.

Sight, Sound and Light Protect Workers—The car operative should always face in the direction of travel even if he is to move only a few feet. Many men who disregarded this counsel have been killed or badly injured. A bell or other alarm should sound automatically whenever the car is in motion, and headlights on the car should be kept burning. It has been general experience, said L. C. Ilsley, electrical engineer, Pittsburgh Experiment Station, U. S. Bureau of Mines, that companies extend the distances over which the battery cars travel beyond those prescribed by shuttle-car manufacturers and thus draw too heavily on the charges in the battery. So now, 15-plate batteries are being used and 17-plate units soon may be introduced. Hydrogen escapes from the battery case for some time after the battery has left the station, especially during the first hour, so caution is still needed, though no explosive gases actually are being generated.

Mobile Loaders Under 700 Ft. of Cover—At the mines of the United States Coal & Coke Co., said James Godwin, chief inspector, Pocahontas Land Corporation, speaking for T. J. McParland, general superintendent, rooms for mechanical loading are driven 18 ft. wide, at 75 deg. to the direction of the entry and on 80-ft. centers. Pillars are drawn by driving open-end cutovers across the pillars, though sometimes a small pillar has to be left against the roof falls, which pillar is drawn back after the cutover has been extended across the pillar its full distance of 68 ft. The coal is 600 to 700 ft. below the surface, and the first work done was the removal of chain and barrier pillars lying with a spread of 600 ft. of coal between two adjacent areas of earlier extraction.

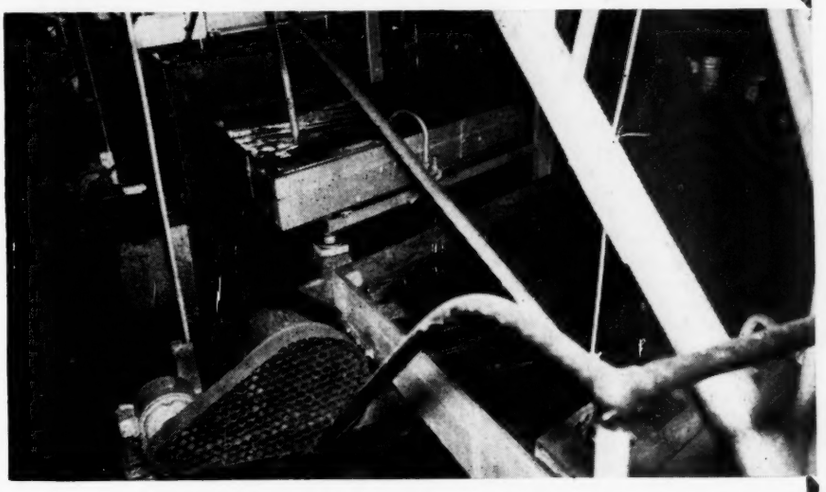
Three Partings in Seam—Down on the

CONCENCO PRODUCTS

Four DIAGONAL-DECK

Deister-Overstrom Coal Washing Tables are used . . .

in the Pittsburg and Midway Coal Mining Company preparation plant at Pittsburg, Kansas.



By the hundreds these Coal Washing Tables are in operation through the bituminous and anthracite fields. User satisfaction is attested by large scale repeat orders from many companies. The mine operator, through the efficient production of Deister-Overstrom and latest model Super-Duty Diagonal-Deck Coal-Washing Tables, can sell to close specifications of ash and b.t.u. consistently.

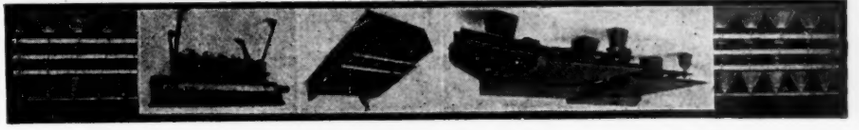
In the new model SuperDuty Coal Washing Tables, the improved "fanning out" action of the Diagonal Deck coupled with the record making Concenco Anti-Friction Head Motion — smooth and easy running — account for *unsurpassed cleaning at surprisingly higher capacities.*

The Deister Concentrator Company

The Original Deister Company
INCORPORATED 1906

909 GLASGOW AVE. FT. WAYNE, IND.

Spray Nozzles • Duplex Washing Tables • Leahy Screens • Constriction Plate Classifiers



floor of the seam is a 4- or 5-in. layer of coal and over that a 3-in. parting of bone or shale. When the coal was loaded by hand the cut was made just over this bone, but, when mobile loading was introduced, universal machines were used to cut what is known as a center cut just below what is regarded as the "middle bone." Despite its name, the 4-in. parting separates the coal into quite unequal benches, the lower of which is 49 in. thick, whereas the thickness of the upper bench is only 20 in. A shear cut a few feet off center is made from the so-called "middle cut" down to the floor. The top bench is not sheared.

Lower Bench Drillholes Pitch Over 20 Deg.—The three drillholes in the lower bench are unusual, for they start near the central horizontal kerf and pitch heavily down to the bottom of the future face, 9 ft. back of the old one, and pass through the lower bone parting on their way (see Fig. 2). The heavy shots discharged in these holes dislodge and break the coal and thus aid in loading, and they also free the floor so that the loading machine has a good surface on which to gather its coal. Three holes are drilled also in the top bench, but these run with the bedding of the seam and almost horizontal.

Support Roof Over Loading Machine—Despite the great strength of the roof, five cross headers, 12 or 14 ft. long, are set over the loading machine at 4-ft. centers and these are supplemented, in the rooms, by a row of posts along the gob at 4-ft. centers and, on the breakline side of the open-end cut, by at least two posts and as many more as conditions warrant. These posts are capped with 4x5x30-in. plank to cushion, yet without preventing, the descent of the roof, and thus let it down enough to protect the posts from breakage.

Low-Carbon Steel Rail and Wide Gage—Track of 40-lb. low-carbon steel is laid in rooms and cutovers. Such soft steel permits the rail to be bent many times without fracture. The gage of the track is made ½ in. wider than that on the main roads (which is 48 in.) so that cars can more readily turn the sharp curves, and this excess width gives satisfaction. Coal is loaded in the center first so that most of the coal can be handled with a minimum of maneuvering.

Commenting on Mr. McParland's observations, Dr. L. E. Young, consulting engineer, Pittsburgh, Pa., declared that, in relations between lessor and lessee, the percentage of coal that can be extracted with mechanical-mining equipment is of increasing importance. Mechanical mining should improve recovery by speeding advance of pillar lines. Observations in the Pittsburgh district seem to indicate that with hand loading, breaklines will advance 1½ to 2 ft. a day, compared with 4 ft. with mobile loaders on usual schedules and as much as 12 to 13 ft. a day in intensive three-shift mining with conveyors.

Addition of Duckbill Essential at Rock Springs—Stating that without duckbill and its attendant swivels, shaking conveyors would have been of no benefit to the Union Pacific Coal Co., George B. Pryde, vice president, said that at Rock Springs No. 4 the coal seam is about 9 ft. thick, and at Superior "C" about 7 ft. Mechanical units, air-driven cutters and drills, first were installed in No. 4 in 1882. Mechanical-loading equipment was first operated in both No. 4 and Superior "C" in 1927. These mines now are on full retreat with shaker conveyors, that having been found the best system of operation. Entries on 300-ft. centers are turned both ways from the main slope and driven to the boundary or other limit of mining, after which the pillars are drawn back, taking stumps and chain pillars as soon as three or four of such ribs are left behind.

Cannot Exceed 1600 Ft. Cover

Rooms are driven up the pitch. Width at No. 4 is 18 ft.; centers, 60 ft. Maximum depth of cover is 1,600 ft. To better extraction and safety, not over two shaker units should be allowed to work together. When a room is driven its maximum length of 300 ft., a breaker row is set and the crew drops back 40 ft., turning the conveyor line into the pillar with two 30-deg. swivels. After driving through to the gob, the stump is worked out, leaving small blocks which soon crush. Then the timber is recovered and another break line set 40 ft. back, whereupon the crew repeats the process, continuing on down to the stump. The roof generally breaks in large slabs.

At Superior "C," with 1,200 ft. of cover and 7-percent pitch, rooms are driven 22 ft. wide on 50-ft. centers, and the same general plan of mining is followed. In No. 4, whenever small bumps occur all equipment is shut down until the places settle and are made safe. A crew for a single shaker unit comprises four to five men, in addition to a foreman and a motorman for two units. On this basis output per man-shift averages 12 tons.

Only 15 Percent of Coal Is Lost—Extraction with the retreat system is about 85 percent, compared with 40 to 50 percent with hand loading. Without this system, much of the coal could not have been mined because of the heavy cover. At No. 4 mine, about 1,600 ft. is considered the maximum depth of overburden under which coal can be extracted by this system. Safety attained

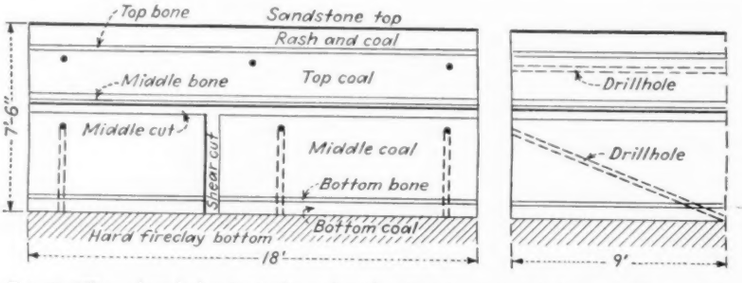


Fig. 2—Three boreholes in bottom bench pitch from just below middle cut to bottom of seam at new face, a nose dive exceeding 20 deg.

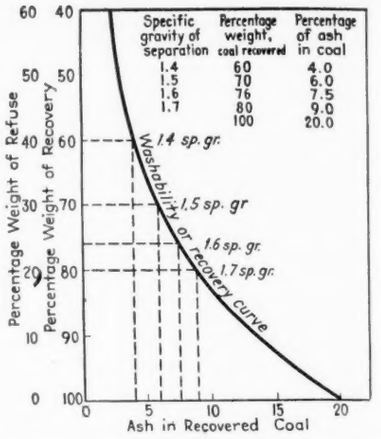


Fig. 3—Recovery curve resembles that traced where one of the coordinates varies as some power of the other coordinate—"a power curve."

at No. 4 in the last five years is indicated by a record of 106,802 man-hours per lost-time accident. At Superior "C," the record is 83,258 man-hours. Since 1936, only one fatality has occurred at No. 4, and it was not in connection with pillar work. At Superior "C," no one has been killed since 1933.

In discussion, Mr. Pryde stated that no conclusions had been reached as to the cause of bumps and no way been found to forecast their occurrence. Timber recovery, with the Sylvester prop puller, is about 75 percent, compared with 25 percent under hand loading. The equipment is operated two 7-hour shifts, with the third for repairs, moving, distribution of supplies, etc. Falls are made and timber recovered also on the third shift or on idle days, as it is considered unwise to attempt such activities while shakers are operating. Narrow rooms and wide pillars have been found the most efficient. Results are about as good in development as in room-and-pillar work. Separate loading points are maintained. Cars are handled by small 5-hp. hoists, which also transport materials along rooms.

Transportation With Mechanical Loading—Output depends largely on transportation, with natural conditions seemingly a secondary factor where large-capacity mobile loading machines are used, declared H. R. Wheeler, mining engineer, Joy Manufacturing Co. Where height is available, Mr. Wheeler added, a better cost seems to be attained when shuttle cars rather than conveyors receive the coal which loading machines deliver.

Straightening Washability Curves—Because the percentage of refuse is never directly proportional to the ash content of the recovered coal at any given percentage of recovery, the washability, or recovery, graph is never a straight line, but a sweeping curve, as in Fig. 3. The curve obtained usually is quite smooth but distinctly bent and much like a "power-curve." Thus y does not equal ax, where y is the percentage of refuse, x is the ash percentage and a a coefficient; y tends rather to equal ax^n where n is less than zero. Taking logarithms, $\log y = \log a + n \log x$ and when the values are represented on a logarithmic scale $Y = A + BX$ where Y is the measurement representing $\log Y$ and X is the meas-

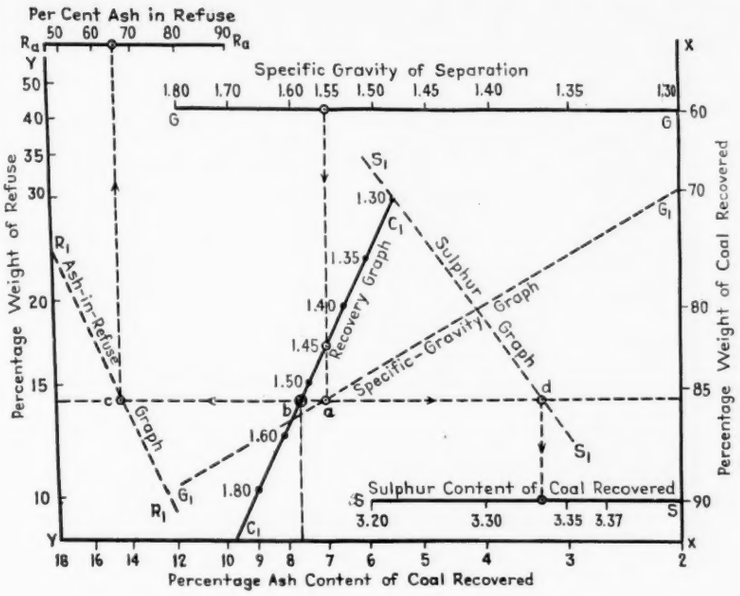


Fig. 4—Washing graphs plotted on double logarithm paper.

urement representing log x. So the recovery curve has been converted into a straight line. This was the manner of operation suggested to the session by G. A. Vissac, consulting mining engineer, Vancouver, B. C., Canada. Specific gravities of separation, sulphur contents of clean coal and percentage of ash in refuse are similarly plotted and all the lines for various recoveries become straight and as plotted on double logarithmic paper quite simple to follow.

Interpretation of Chart—Fig. 4 shows the washability characteristics of a No. 3 bed Indiana coal with the curves reduced by logarithmic plotting to straight graphs. To show how these graphs can be used for ascertaining results attainable by suitable cleaning methods, a specific gravity of 1.55 may be assumed and a vertical line or ordinate dropped from that point on the line GG to intersect at a the specific gravity graph G_1G_1 cutting it at a. The horizontal line from a gives, at the right along XX, the weight percentage of clean coal by intersection with that vertical line and in a similar manner on the left along YY the percentage weight of refuse.

The same line from a cuts the ash-content, or recovery, graph C_1C_1 at b, the ash-in-refuse graph R_1R_1 at c, and the sulphur graph S_1S_1 at d. Ordinates from these points cut respectively the line XY at 7.7 percent, the line R_aR_a at 68 percent, the line SS at 3.34 percent, giving respectively the ash content of the clean coal, the ash content of the refuse, and the sulphur content of the clean-coal recovered.

Clarity of Expression—When eleven different coals were plotted by ordinary non-logarithmic methods on a single chart, the lines crisscrossed, but when they were scaled logarithmically along both axes, they did not cross, and coals of low inherent ash segregated themselves entirely from those of medium or high inherent ash. This fact makes it possible to plot the washability graphs of the several sizes of coal in a single chart and connect points on each graph for the several given specific gravities with lines representing those gravities, so that incidentally the chart appears to represent a body of three dimensions. This has been done in Fig. 5. Thus the coals seem almost to be fingerprinted, for, like human fingers, they may almost be identified by their whorls.

Stating that the method of graphic representation advocated by Mr. Vissac eliminated much of the chaos hitherto encountered, Byron M. Bird, Battelle Memorial Institute, pointed out that the equation for a washability curve embraced several factors other than those given. However, these other elements apply only to the ends of the curves, in which the preparation engineer is not interested, whereas the simplified equation covers the part with which he habitually works. H. F. Yancey, U. S. Bureau of Mines, asserted that the suggested change from curves to straight lines is desirable.

Almost 100 Miles of Gangways—When the Lehigh Navigation Coal Co., Inc., made a timber survey of its tunnels and gangways in 1925 it ascertained, stated P. L. Burkhart, test engineer, of that company, dry-rot failures were about twelve times as numerous as wet-rot failures, though, as he explained later, most of the timbers were in such wet places that they could not fail from dry rot. Gangways that were dry when driven usually become wet later.

As a rule, air-seasoned timber is steamed for a short time, after which a vacuum is applied that will prepare the timber to take the specified treatment. The condensed steam is drawn from the treating cylinder and then, without breaking the vacuum, the treating solution is run into the cylinder and pressure applied until a specified quantity of the solution has been injected into the timber. With the full-cell treatment, the solution is run out of the cylinder without a final vacuum to draw out any excess of solution. Steam-seasoned timber must be steamed longer than air-seasoned, and steaming must be followed by a longer vacuum period and with a higher vacuum than air-seasoned timber or the stick will not take the specified treatment.

How Poles Are End-Impregnated—The end-impregnation process of treating is similar to that patented in 1855 by Dr. Boucherie, of England, which provided for the injection of a preservative solution into the ends of poles through a wooden head under a pressure of 15 to 20 lb. per square inch, using, however, copper sulphate as the preservative. Not over ten days prior to treatment the tree is cut down and trimmed. The bark is at no time removed, but the logs are cut off square to the length desired, with the end of log, bark and about $\frac{3}{4}$ in. of wood shaved off on a bevel so that the rubber gasket of a metal treating head can be brought in tight contact with the end of the log, which is then placed on a treating rack where the head can be adjusted to the beveled end.

Treating solution with a specified percentage of dry zinc chloride or chromated zinc chloride is then forced through the log under 25- to 50-lb. pressure. In about 15 seconds from the time the treating solution enters the head the sap and moisture in the cells begin to be forced out of the free end of the log; this treatment is continued until the solution thus escaping has at least a concentration of 3 percent. On completion of treatment, the logs are framed ready for shipment.

Only Green Timber Can Be End-Impregnated—When wood has lain for over a month after being cut, it cannot be treated successfully by this method, as the pitch or sap coagulates, preventing the free passage of the treating solution. No preliminary steaming or preliminary vacuum after steaming is needed. Time can be gaged to suit variation in the resistance of the timber to impregnation; much less pressure and lower temperatures can be used than with treatment in a cylinder, so rupture of cells would appear less likely. No final vacuum is needed; thus the wood cells are less likely to be collapsed. Logs when cut show that 90 to 95 percent of their cross-section is impregnated.

To obtain comparative life records, sticks of treated and untreated timber were tagged

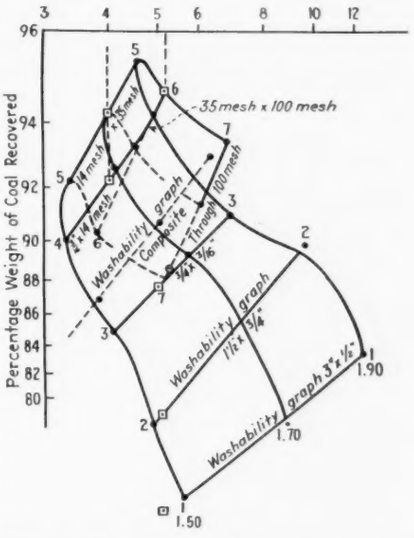


Fig. 5—Compound washability graphs of Black Creek bed coal, Yolande No. 6, Rockcastle, Ala. Washability graphs of seven sizes grouped and the values for three specific gravities joined by three specific-gravity curves.

and placed in sections where, at the time of placement, it was thought that failure would occur from dry rot, a fungus growth that impairs timber strength. Squeeze failures are caused by top or side pressures. Mined-out timber designates such timber as was placed in sections that were abandoned while the timber was still serviceable; the service life covers time between timber placement and abandonment of section. "Other causes" of failure cover timber knocked down in car derailments, removed for erection of chute spouts, etc., because the identity of the timber became lost after it had given the service noted.

Water Preserves Timber—In the bituminous coal mines, said Mr. Burkhart in discussion, all the timber would have failed by dry rot, but, in the Navigation's mines, most of the tunnels and gangways are so wet that much of the untreated timber does not rot and the solutions in the treated timbers are leached out; but wherever the workings are not wet, the treatment is of great value. Unfortunately, one cannot be sure whether enough moisture will be present to preserve untreated timber, as most of tunnels and gangways are dry when driven and first timbered. Zinc chloride-treated timber is being used for sets in chute work, not in the coal bed itself, for such timbering is expected to be in service for only a short time, but in the rock chutes under the bed which are more permanent.

Spores Reach Timber Heart

Why Depth of Impregnation Is Essential—It has been contended that as fungus started as a spore at the surface of the timber it is enough to impregnate only the surface of the timber and a short depth beneath it, but when heavy pressures occur the cap timber may open up a crack that will extend to the heart of the timber, and fungus can then enter the interior of the cap. With impregnation in a cylinder the impregnating fluid enters by the periphery and ends of the timber, entrapping air in a long lens paralleling the center line at a distance from the ends of the timber. This air has no way to escape. Where it accumulates the timber is not impregnated. Wet timber, declared H. H. Otto, chief engineer, Hudson Coal Co., even where untreated, lasts a long time as may be noted in wet shafts.

Gob Temperatures up to 125 deg. F.—In worked-out areas of the Lehigh Navigation Coal Co. mines, where coal has been left in place and the surrounding gob is packed by weight, declared A. T. Beckwith, special engineer of that company, the heat generated by slow oxidation of the coal and timber or by other causes is not easily dissipated. This gob heat may be found in remining or in new workings after they have broken into a gob. The atmosphere usually is devitalizing and saturated and temperatures up to 125 deg. F. have been recorded. Thus far it has been found possible to reduce these excessive temperatures by providing as large a split of air as possible and by cooling the working either by a jet of compressed air or by auxiliary ventilation carried to the face through a conduit.

Natural ventilation traveling up the fallen goafs and gobs which pitch heavily provides much of the mine air flow but the quantity of this air varies greatly, being dependent on the temperature of the air entering the mine at the surface. Thus, with a surface temperature of 33 deg. F., 43,000 cu.ft. per minute was exhausted through the gob, whereas, with a surface temperature of 83 deg. F., the quantity of air thus traveling was only 27,000 cu.ft. per minute. Also the quantity passed through the fan was greater at the lower outside temperature.

Ten Tons of Air Per Ton of Coal Produced—In addition to the flow produced by natural ventilation, fans move from 300 to 500 cu.ft. per minute for each employee underground. The law requires that each subsurface employee receive a minimum of 200 cu.ft. per minute. For ventilating the company's five mines in the Panther Creek Valley, nine fans are used; their individual capacities range from 30,000 cu.ft. per minute at 1-in. water gage to 210,000 cu.ft. per minute at 4.4-in. water gage. Combined they circulate 1,000,000 cu.ft. of air per minute and use 890 hp.; for the year 1940 they consumed 16.4 percent of all electrical power used in mine service. With broken working time but continuous fan operation, the average quantity of air circulated has averaged 10 tons for each ton of coal produced.

Compressed Air Injectors—In past years small fans, driven by 5-hp. or 10-hp. electric motors, were used extensively to blow air through conduits when ventilating certain advancing chutes, tunnels or other places, but compressed-air injectors now are generally used instead of fans where auxiliary ventilation is needed. These injectors, which are either blowing or exhaust units, consists merely of a jet of compressed air which discharges along the axis of 6-, 8- or 10-in. diameter conduit made of No. 16 gage galvanized iron pipe with stovepipe ends. Larger diameters are used for special work.

Venturis Unnecessary—Although, locally, plain conduits containing a jet have been in greatest favor, homemade single-cone, double-cone and fairly well-designed venturi injectors have been made and used, apparently in the belief that such units would produce exceptional results, but tests have shown that the total quantity of air discharged with the venturi is no greater than by the plain conduit and that the total quantity of air discharged remains the same whether the jet, with a plain inlet, is inserted 3 in. or 16 in. from the back of the conduit and this probably is true also of a wider range of distances.

On being asked why the electric fan had been displaced by the compressed-air jet, Mr. Beckwith said the latter was the more readily installed. Strong gob drafts were experienced also at the Jeddo mines, said C. A. Garner, vice president in charge of operations, Jeddo-Highland Coal Co. With broken ground, some auxiliary ventilation is unavoidable. Jet ventilation is used at the Jeddo mines, but auxiliary fan ventilation is preferred. At the Navigation mines, the number of fans in use is decreasing, said Mr. Beckwith. The company has made tests with altimeters, using one below ground and one at the surface, but the work has not been successful. One might well expect that would be so, said A. Lee Barrett, maintenance engineer, Pittsburgh Coal Co., because of the rapid changes in air volume that inevitably result from changes in temperature wherever beds pitch so heavily. He would prefer to use an inclined water gage.

When to Use a Conical Drum on Hoists—With short lifts, if high speed in hoisting is desired, much may be saved by using a cylindro-conical drum, indicated F. L. Stone, chief mining engineer, General Elec-

Table I—Results of a Timber Survey Made in 1925 of Lehigh Navigation Tunnels and Gangways, Before Treated Timber Was Introduced.

Length of tunnels and gangways	522,987 ft. — 99.05 miles
Length of tunnels and gangways, timbered	224,880 ft. — 42.58 miles
Percentage of tunnels and gangways, timbered	43.00 percent
Number of steel sets in use	2,412 or 3.64 percent
Number of timber sets in use	63,834 or 96.36 percent
Number of timber sets with evidence of rot	50,419 or 78.98 percent
Number of timber sets with evidence of squeeze	13,415 or 21.02 percent
Percentage of all timber sets showing evidence of failure	
By wet rot	6.00 percent
By dry rot	73.00 percent
By squeeze	21.00 percent
Average life of a wood set in Panther Valley	5.3 years

Table II—Comparative Service Life of Navigation's Tagged Timber, as of September, 1940.

Cause of Failure	Percentage of Failures		Average Months of Service Life	
	Treated	Untreated	Treated	Untreated
Dry rot	8.2	58.8	107	68
Squeeze	19.7	18.9	59	36
Mined out	25.3	11.7	76	59
Sealed off	0.5	0.6	22	24
Other causes	4.5	6.6	57	28
All causes	58.2	96.6		

Table III—Comparative Costs Per Set of Treated and Untreated Timber at Navigation Mines

	Failed From Dry Rot		Failed From Squeeze	
	(1) Treated	(2) Untreated	(1) Treated	(2) Untreated
A — Cost of timber	$10.88	$6.49	$10.88	$6.40
B — Cost of labor for placing	14.80	14.80	22.34	22.34
C — Cost of timber in place	$25.68	$21.29	$33.22	$28.83
D — Average life of timber, years	8.92*	5.67‡	4.92*	3.00‡
E — Inverse ratio of service	1.00	1.57*	1.00	1.64†
F — Cost per life of treated set: CxE	$25.68	$33.43	$33.22	$47.28
G — Savings by use of treated timber; F(2) − F(1)	$ 7.75	.....	$14.06	.....
H — Percentage saved on additional expenditure of $4.39 for treated timber	23.2	.....	29.9	.....

* 1.57 = 8.92 ÷ 5.67. ‡ See Table II. † 1.64 = 4.92 ÷ 3.00.

tric Co., showing an instance where, with an 8-ft. drum, a little over 1,000 hp. would be required. However, with three turns on a cone, by increasing the diameter from 7½ ft. to 11 ft., 600 hp. would suffice. However, if the coal load is doubled and the speed is reduced to hoist the same tonnage, it will be found that the cylindro-conical drum will be of no particular advantage and that the horsepower of the motor can be greatly reduced, no matter which type of drum is provided. In general, the cylindro-conical drum cannot be used for hoisting from more than one level, but cases arise where it proves beneficial.

Should Direct-Current or Induction Motor Be Chosen?—If a hoist is to be driven by direct current using Ward Leonard control, it will cost three or more times as much as an induction-motor-driven hoist. Because the rheostatic losses during acceleration and retardation are serious with the induction motor and amount to about half the total energy taken from the line during those periods, the over-all efficiency of a short fast cycle usually is very much greater when Ward Leonard control is provided. On some cycles, Ward Leonard control would pay for itself in a comparatively short time, but, on long cycles, the induction hoist shows a decided advantage, for with the Ward Leonard installation practically three machines in series are needed to do the work of one.

Testing Mine Fans—Refinements in the field testing of fans are more possible with axial-flow mine units than with centrifugal fans, because the fan inlet and outlet are more sharply defined, giving closer agreement as to just where the fan begins and ends; thus authorities are less likely to disagree as to the proper location for measurements of fan pressure, declared Raymond Mancha, manager, ventilation division, Jeffrey Mfg. Co. Moreover, the area of the passage leading into the inlet of an axial-flow mine fan usually gradually contracts, causing high air velocities with accompanying steadiness of flow. Thus, the fan inlet offers the pitot tube, an ideal location for accurate air-volume measurements.

Diesels for Mine Haulage

Diesel Locomotives—Battery locomotives could not handle the work in one section of the Delaware Aqueduct, said Fred W. Stiefel, chief engineer, Samuel R. Rosoff, Inc., in a symposium on the use of such units underground, so five 14-ton diesel units costing $58,000 were acquired. Comparable cost of six battery units would have been $188,000, including auxiliary equipment, and, with battery equipment, operating cost would have been $509 per day of 24 hours; with diesels it was only $413. Moreover, with electric equipment, the work would not have been completed so soon. In actual operation, the diesel equipment gave an operating cost of a little over 2c. per ton-mile.

The less desirable features of diesel equipment, Mr. Stiefel pointed out, are higher air requirements and more scientific maintenance. But while these might appear to be disadvantages, both actually benefit the operation in the long run. Diesels, he stated, apparently can take the place of other locomotives where ventilation is, or is made, ample. Diesels also provide a greater speed of 20

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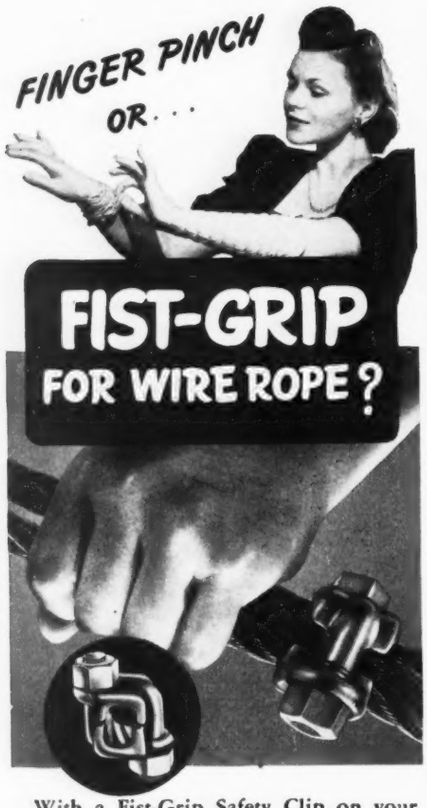

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m.p.h., but require heavier rails and ties and good joints. With an air flow of 10,000 c.f.m. per locomotive, exhaust-gas concentrations were unobjectionable.

After preliminary studies, according to a paper presented by William B. Harris, for himself, Leonard Greenburg and Gustav Werner, of the Department of Labor, Division of Industrial Hygiene, and the Bureau of Mines, Division of Inspection, New York State, use of diesel locomotives was permitted in the aqueduct under regulations of the New York Department of Labor, these covering engine design and maintenance (including fuel-air ratio, flame arresters, cooling and dilution of the exhaust gases, etc.), toxic-gas concentrations in the tunnel air, testing of the locomotives after going into service and ventilation requirements.

Air-Purity Demanded — Toxic-gas concentrations were limited to: CO, in general tunnel air, not over 0.002 percent; oxides of nitrogen, 40 parts per million, with sulphur dioxide, aldehydes, visible smoke and other irritants in the exhaust gases low enough to prevent toxic or irritating atmospheric conditions or interference with vision in the tunnel. Ventilation specifications were set up on a minimum of 10,000 c.f.m. per locomotive, with auxiliary ventilation of 3,000 c.f.m. in the face zone. All headings were required to be separately ventilated by primary exhaust systems and in accordance with other auxiliary regulations.

Twenty-to-One Air-Fuel Ratio Essential— As a result of tests on trucks, bulldozers and locomotives underground, it is concluded that diesel engines can be safely used provided certain strict regulations are observed. Among other requirements a 20:1 minimum air-fuel ratio must be maintained, the exhaust gases must be cooled and scrubbed and the exhaust must be diluted 10 to 1 before discharge. "Careful correlation of all factors has shown that control of CO to the set limit of 0.002 percent affords adequate control of all noxious elements." In ventilation, the governing factor is maintenance of a minimum of 10,000 c.f.m. in any area in which an engine is, or may be, operating.

Beware Oxides of Nitrogen

Oxides of nitrogen are ten times as dangerous as CO, said S. H. Ash, supervising engineer, U. S. Bureau of Mines, Wilkes-Barre, Pa., and L. L. Naus, engineer-in-charge, Albany, N. Y. However, diesels can be used with safety if certain regulations are followed. Air requirements should be based on the needs of the haulage men, and at maximum speed and load should be at least 65 to 75 c.f.m. per brake horsepower of the engine. Air should be sampled regularly to assure that toxic gases are kept within safe limits.

Legal Restrictions in Use of Diesel Units— Few states allow internal-combustion-engine equipment underground, and in most of those where the laws do not actually forbid their use, inspectors seem disposed to do so under the permissive or general safety sections of those enactments, declared Jay A. Carpenter, director, Mackay School of Mines.

Among the points raised in the ensuing discussion were the following: ordinary methods ignite diesel fuel with difficulty; it cannot be lit with a match; diesel locomotives may be built with any reasonable

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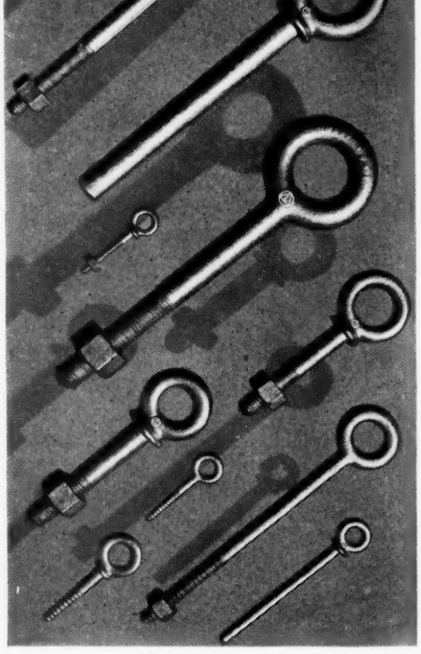

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height and width limitations; proper ventilation will eliminate exhaust gases from the atmosphere; clean intake and exhaust systems are needed to prevent the excessive discharge of toxic gases and smoke; diesels have a real opportunity to decrease haulage accidents; equipment is now being made ready by the Bureau of Mines to test diesel equipment for permissible classification; proper fuel injection and maintenance of fuel pumps are important items; regulations governing diesel operation do not hamper operation but rather result in increased efficiency. Mr. Stiefel pointed out that in 1½ years of battery locomotive operation 54 accidents occurred, whereas a diesel mileage of 135,000 to 145,000 was rolled up without an injury.

Development of Air-Cleaning Equipment—Machines using air currents, declared D. R. Mitchell, head, department of mining engineering, Pennsylvania State College, although not using them in the same way as most of the equipment now employed, date back to 1859, when a crushing unit with air blast was devised that was said to make it suitable also for use as a separator. An early predecessor of modern air equipment was the Arizona dry washer, consisting of a perforated deck with riffles mounted on top of a bellows and used for separating gold or other metals from rock. One of the first jobs of Sutton, Steele & Steele was to mechanize the Arizona dry washer.

Four Types of Air Cleaners

Air-cleaning equipment, added Dr. Mitchell, might be divided more or less arbitrarily into jig, table, launder and sink-and-float type. Jig-type machines include the British Kirkup, somewhat similar to the early Arizona dry washer, and the present Stump cleaner, developed by Earl Stump in 1932 and now widely used. The latter employs a porous medium under the cleaning surface for better air distribution, as well as a shaking screen over this porous medium to keep the bed fluid.

The first successful air table was developed by Sutton, Steele & Steele. The original unit has undergone numerous changes and improvements, with the latest type essentially two tables combined into one machine, the shape of the sections going back to the early SJ table, first to be equipped with the banking bar. Other tables include the Arms (not now manufactured); the Peale-Davis, a large high-capacity unit designed to clean a wide range of sizes (none have been built in recent years), the British "Berrisford" and Whessoe-Bamag, and the American Koppers "KRM," developed in Belgium and France.

Launder-type air cleaners include the British Raw and British Barker, the latter similar to the Raw. Sink-and-float separators include the Fraser "Air-Sand," installed at a number of mines in the United States and using a separating medium of sand made fluid by air, and the Prins, a test installation of which was made in Illinois.

Byproduct-Oven Advances—Byproduct installations now in operation or building can carbonize 90,000,000 tons of coal annually, producing thereby 63,000,000 tons of coke, asserted C. J. Ramsburg, vice president, Koppers Co. Byproducts include gas, coal tar, light oils and ammonia, the light oils

*600,000,000 TONS

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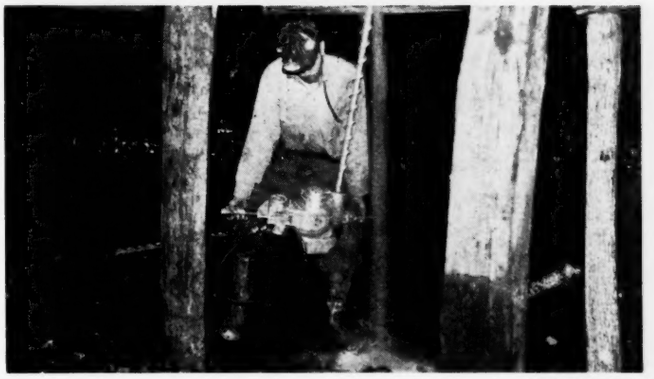

* Over 622,000,000 tons of coal is the War Production Board's estimated requirements for 1942.

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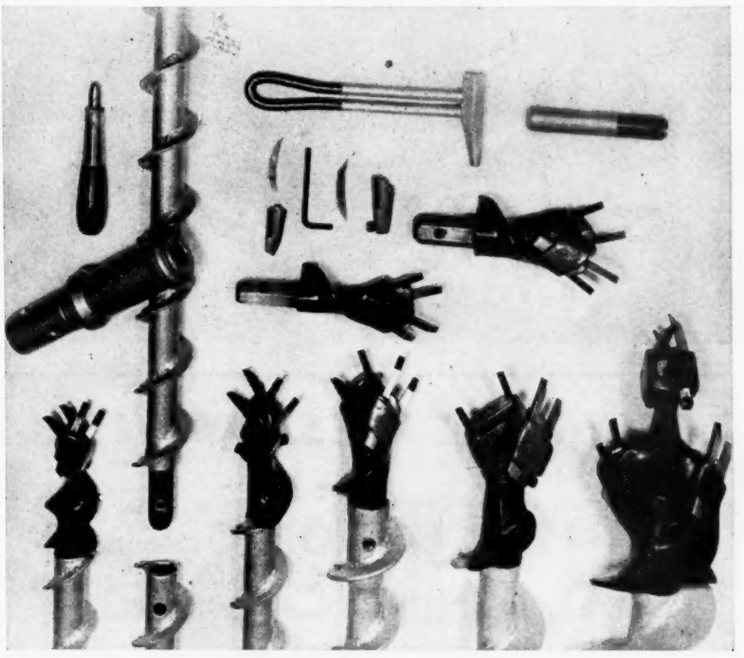

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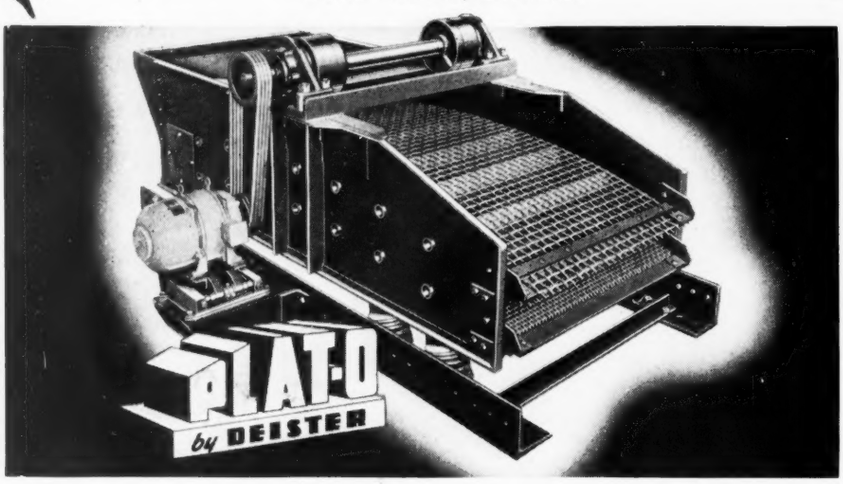

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providing, among other products, benzene and toluol, the latter an important ingredient in TNT, a major military explosive.

Among the improvements in byproduct ovens has been the enlargement of the coking chambers, said W. C. Rueckel, also of the Koppers Co. This change in turn has stimulated research into the possibilities of long-flame combustion in oven heating, with its attendant advantages of higher ovens, greater capacity and lower cost.

Why Not Have Fuel Technology Curriculum?—So extensive has become the body of knowledge that comprises the technology of fuels that there is need for a curriculum in fuel technology, but only in the colleges and universities strategically located with reference to field resources, asserted Dr. Gauger. There should be some place where men desiring to specialize in fuel technology should have opportunity to pursue such studies.

The value of the mineral fuels in 1929 was 48 percent of that of all the minerals produced at the mines; of this, coal contributed 34.4 percent; petroleum, 14.3 percent, and natural gas, 3.3 percent. In the United States between 1880 and 1939 the mineral fuels contributed 52.7 percent of entire mineral wealth of this country.

The need for technologists specially trained for the petroleum industry has been recognized for fifteen years and much progress has been made in petroleum technology. The coal-mining industry has no similar history of technologic advance except in so far as mechanization and mining methods are concerned. One of the reasons for this failure of the industry to plow part of its profits back into the business in the form of research undoubtedly is the scarcity of technical men in responsible positions of management.

Dr. Gauger said he knew of only one coal company that has a man who is a scientist in his own right as its president. This is one of the obstacles to a full appreciation of the value of scientific work and to the selection of properly trained technologists to conduct it.

When the Engineering Committee for Professional Development first started accrediting curriculums it found there were 58 of them. It has tried to reduce these and now there are but 14, said E. A. Holbrook, dean of engineering, Pittsburgh University. Examiners for engineering licenses are unwilling to recognize unknown professions. There should be only six or eight different engineering degrees. No excuse exists for fuel technology as a curriculum, declared E. A. Stephenson, professor, petroleum engineering, University of Kansas. It should be sufficiently covered by chemical engineering. E. G. Bailey, vice president, Babcock & Wilcox Co., backed the stand of Dr. Gauger but wanted the study to be designated fuel engineering.

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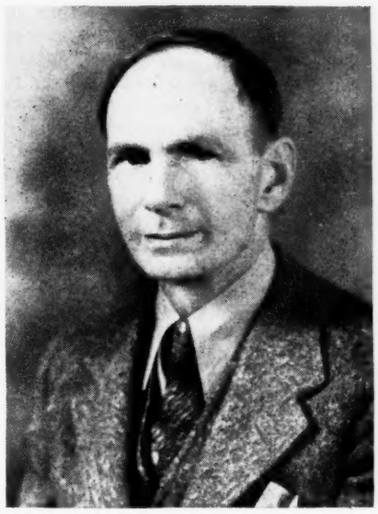
Goode Mine Nearly Ready

A new mine is being opened in the suburbs of Mullens, W. Va., by the Goode Coal Co., Inc., where construction of a tipple has been virtually completed. It is planned to begin operations almost immediately. Principally interested in the new company are Paul Goode and Jeff Goode, both of Mullens.



C. E. Nighman

Explosives Licensing Under Way With Nighman in Charge

Arrangements for administering the Federal Explosives Control Act were virtually completed in February with the appointment of licensing agents and the selection of the head of the Explosives Control Bureau. After March 1, manufacturers, vendors, purchasers, foremen, analysts, etc., must obtain regular licenses for sale and handling of explosives. Not only must each mining company have a purchaser's license to obtain explosives but if it issues and sells explosives to employees it also must have a vendor's license, and each man in charge of sale or distribution of explosives also must be licensed.

Licenses as a general rule are issued by the county clerks in each county, but where these have declined to serve, other persons, such as justices of the peace, notaries public and judges, have been designated. C. E. Nighman, acting assistant to Dr. R. R. Sayers, director of the U. S. Bureau of Mines, was appointed by Secretary Ickes on Feb. 19 as chief of the Explosives Control Division, in charge of operations under the Federal Explosives Control Act.

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Personal Notes

A. E. Burgessor, preparation plant superintendent for the Pittsburgh Coal Co., has been shifted to the company's Warden mine, Sutersville, Pa., as superintendent.

H. A. Corre, for the last several years assistant mine foreman with the Consolidation Coal Co., West Virginia Division, has been added to the staff of the extension division of Pennsylvania State College, State College, Pa. He will be an instructor and assistant supervisor of mining extension.

C. H. Dodge, formerly safety engineer for Buckeye Coal Co., Nemacolin, Pa., has been appointed a senior coal-mine inspector, U. S. Bureau of Mines, and will be stationed at Mount Hope, W. Va. He had been with the Buckeye company for twelve years, receiving a watch from officials of the company before his departure.

P. L. Dryer, former chief engineer of the Alabama Fuel & Iron Co., Birmingham, was honored Feb. 21 on the completion of 50 years of service with the company. A barbecue in observance of the event was given at the Aemar mines and attended by about 2,000 employees. Mr. Dryer, who has served three generations of the DeBardeleben family, which established and operates this company, retired last year from active service. Though he retired officially, each day usually finds him at his office.

Thomas A. Duke has resigned as manager of the Denver (Colo.) office of the Bituminous Coal Division to reenter business in Pueblo, Colo.

Thomas G. Fear, succeeding W. A. Gallagher, who resigned to join the Inspection Division of the U. S. Bureau of Mines, has been appointed general superintendent of the Minds Coal Mining Corporation, which operates in Randolph County, West Virginia. He had been, since the fall of 1940, general superintendent of the Sonman Shaft Coal Co., a Koppers operation in Pennsylvania. Previous to that he was general manager of operations of the Consolidation Coal Co., so is familiar with West Virginia mining. He left "Consol" in 1932 to become assistant to the president of the H. C. Frick Coke Co., then on Oct. 1, 1938, he was made manager Elk Horn Coal Corporation, Wayland, Ky.

A. F. Harper has left the National Coal & Coke Co. to accept appointment as superintendent of mines for the Cane Creek Mining Co., Bankhead, Ala.

Charles H. Hayes has resigned from the Bituminous Coal Division to accept a position as technical adviser with Bituminous Coal Producers' Board No. 7, with headquarters in Washington, D. C. He has been for several years chief of the Coal Division's traffic section of the Marketing Branch.

Lee Long, vice president in charge of operations, Clinchfield Coal Corporation, Dante, Va., has resigned as a member of the Virginia State Highway Commission.

David Meredith, formerly general assistant foreman at Montour No. 10 mine of the Pittsburgh Coal Co., Library, Pa., is now mine foreman at Somers mine, Pricedale, Pa.

Thomas G. Fear

W. F. Schulten

Ralph O'Brien has been placed in charge of the Champion No. 5 cleaning plant of the Pittsburgh Coal Co., Banning, Pa.

Byron O'Neal, of Staunton, has been appointed a member of the Illinois Mining Board, vice Joseph E. McMullen, resigned. Mr. O'Neal's appointment was recommended by William Keck, president, Progressive Miners. Other members of the board are Walter Gill, Peoria; Ben Schull, Pinckneyville, and John Mentler, Centralia.

W. A. Romek, assistant manager, Montana Coal & Iron Co., Washoe, was elected president of the Montana Coal Operators' Association at its annual meeting. Other officers are: vice president, G. E. Gildroy, president, Bair-Collins Co., Roundup; secretary-treasurer-commissioner, D. F. Buckingham; assistant secretary-treasurer, Miss Kathryn Laukaitis.

H. D. Schminky, formerly with the Philadephia & Reading Coal & Iron Co., has accepted a position as assistant superintendent with the Loyal Hanna Coal & Coke Co. at Cairnbrook, Pa.

W. F. Schulten has been named as assistant to the president of the Pittsburgh Coal Co., Pittsburgh, Pa. Through his office will be cleared regulations, special problems growing out of the war, and the coordination of the company's war effort with that of the nation. In assuming his new duties Mr. Schulten continues as traffic manager.

John Swetts, formerly mechanic foreman at Westland mine of the Pittsburgh Coal Co., Westland, Pa., has been promoted to master mechanic at Warden mine, Sutersville, Pa.

George O. Tarleton has succeeded B. H. McCrackin as manager of the Maryland Division of the Consolidation Coal Co. Mr. Tarleton has been assistant to the manager of the West Virginia Division.

A. W. Thorson, of Detroit, Mich., assistant fuel service engineer for the Chesapeake & Ohio Ry. Co. for the last two years, has

been appointed assistant to the president of Carnegie Institute of Technology, Pittsburgh, Pa. He will assist President Robert E. Doherty in obtaining financial support for the Coal Research Laboratory and also will aid H. H. Lowry, director of the laboratory, with its general business operations. A graduate of the University of Missouri and formerly employed by the Detroit Edison Co., he has had a varied experience in power-plant operation and testing and combustion engineering service.

RHEIN TINSLEY has accepted an appointment as district mine inspector of the Department of Mines of West Virginia, the third time in recent years he has held such a post. Prior to his appointment he disposed of his interest in the Big Branch Winifrede Coal Co., Inc., to his associate in the latter organization, W. E. Burchett. The company was formed last July with a capital of $20,000 to operate holdings on the Big Branch of Pigeon Creek, in Mingo County, West Virginia.

WILLIAM M. WHEELER, Pikeville, Ky., has been named assistant technical adviser for Coal Priorities under D. L. McElroy in the Mine Priorities Branch of the Materials Division, WPB. Mr. Wheeler has been associated with the Koppers Co. and the Goodman Mfg. Co. since his graduation from West Virginia University School of Mines in 1936. EDWARD H. ROTT has replaced Merle Guise as technical consultant on precious metal and foreign mines, assisted by FRANCIS O. HAUSSERMAN. S. E. COBB has been named an associate mining analyst.

E. L. WOODS, president, Crystal Block Coal & Coke Co., Huntington, W. Va., was re-elected president of the Operators' Association of the Williamson Field at its 28th annual meeting. Also renamed were: vice president, C. A. HAMILL, president and general manager, Sycamore Coal Co.; treasurer, J. D. MCLAUGHLIN; secretary, J. J. ARDIGO.

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Maintenance Group Organizes In Monongahela Valley

Recognizing the need for a better understanding of the operation and maintenance of mining equipment, a group of mining maintenance men in the Monongahela Valley of western Pennsylvania have formed the Bituminous Mining Maintenance Association. At its initial meeting the following officers were elected: president, C. R. Drum, general master mechanic, Vesta Coal Co.; vice president, Thomas Davies, master mechanic, Buckeye Coal Co.; treasurer, Howard F. Miller, chief electrician, Crucible Fuel Co.; secretary, Henry Neil, chief electrician, Vesta No. 5 mine, Vesta Coal Co. An executive committee composed of one man from each of the company groups will guide future actions of the association.

The association meets monthly at various places in the valley. At the January meeting, H. R. Meyer, manager, maintenance sales, Westinghouse Electric & Mfg. Co., discussed "Preventive Maintenance," in which he outlined the need for periodic inspection of equipment and keeping it in good repair. He described methods followed by Westinghouse in its own plants to do this job, also detailing the keeping of card records of various equipment to assure periodic inspection and reconditioning. The second meeting, held in February, was featured by a discussion by Graham Moses and John Askey, design engineers of Westinghouse, of the repairing of coils, the value of insulations for this purpose, and testing of rotating electrical apparatus with regard to good maintenance practice.

At the March meeting, E. J. Gleim, U. S. Bureau of Mines, will talk on "Government Approved Mining Equipment."

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Restriction of Gas Heating Ordered by WPB

Restriction in consumption of natural and mixed natural and manufactured gas was ordered by the War Production Board on Feb. 15 to assure adequate supplies for war production activities. The order was issued, according to the board, because of pressing gas requirements for both war and civilian use, coupled with scarcity of materials that would be required if existing facilities were expanded. An important item is the program to manufacture synthetic rubber, the major part of which is to be made from butadiene, produced from natural gas.

Part of the order, effective March 1, applying to 17 states, prohibits new installations of natural-gas heating systems as well as the conversion of systems using other fuels to gas. Delivery of gas to any non-residential consumer or increasing delivery to any existing non-residential consumer is prohibited unless: (a) Such new or existing consumer has installed standby facilities sufficient to replace new or increased delivery during periods of shut-off; or (b) such new or existing consumer cannot reasonably use any other fuel than gas; or (c) approval shall have been granted in advance by the Director of Industrial Operations for delivery to such new or existing consumer. This provision becomes effective ten days after issuance of the order. A consumer now using gas to cook or heat water is not required to refrain from such use, nor are companies distributing or consumers of manufactured gas affected.

Companies in the following states are affected by the parts of the order effective March 1: Alabama (except the area served by the United Gas Pipeline Co.) Arkansas (only the area served by the Mississippi River Fuel Co.), California, District of Columbia, Georgia, Illinois, Indiana, Kentucky, Maryland, Michigan, Mississippi (except the area served by the United Gas Pipeline Co.), Missouri, New York, Ohio, Pennsylvania, Tennessee, Virginia, and West Virginia.

Other parts of the order, applying over the entire country, do not become operative until a shortage occurs or becomes imminent in any area. These are:

1. Each utility is required, in so far as practical, to integrate its system with other systems so as to obtain a maximum supply of gas.

2. If gas supply is insufficient and reduction to customers becomes necessary, the following steps should be taken in the order given, in the absence of specific directions by the Director of Industry Operations:

(a) Reduce deliveries to all dump or surplus customers not engaged in war production. (Dump or surplus customers are consumers whose gas service is subject to interruption during shortage periods.)

(b) Operate as much of its manufacturing equipment as is necessary to relieve the shortage.

(c) Reduce deliveries to all firm gas customers who have standby facilities.

(d) Reduce deliveries to other customers in such manner as to cause the least interference with war production. All possible measures will be taken before interference with war production is permitted.

Oil Rationing Discussed

Developments in the heating oil situation during the first two weeks of February seemed to point strongly to the likelihood of rationing in the Atlantic seaboard area. Appearing before the House Interstate Commerce Committee on Feb. 17, in support of a proposed cross-country pipeline, Oil Coordinator Ickes said he did not want rationing of oil and gasoline, and would turn to it only as a last resort. He admitted, however, that he had discussed rationing with Leon Henderson, Price Administrator.

Two days later a large newspaper advertisement notified Esso fuel-oil customers in the East that deliveries of fuel oil would be restricted as follows: for all commercial use, including war industry plants, deliveries would be limited to 14 days' supply; for home owners and other heating-oil users, no deliveries will be made until supplies on hand have reached less than one-fifth of tank capacity.

Stocks of light fuel oil—used for the heat-

Bituminous Mining Maintenance Association, Monongahela Valley Section, in session at its second meeting. C. R. Drum, president, is shown at extreme left, front; Thomas Davies, vice president, extreme right, front.

ing of homes—in the Eastern United States on Feb. 14 totaled 10,328,000 bbl., a decline of 2,428,000 from the total of a week earlier, 12,756,000 bbl., according to the American Petroleum Institute.

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Semet-Solvay Mine to Reopen Under Union Contract

Reopening of the Semet-Solvay Co.'s big captive mine at Henry Clay, 20 miles east of Pikeville, Ky., was foreshadowed on Feb. 16 when a contract between the company and the United Mine Workers was signed. Tom Raney, a representative of District 30, U.M.W., said the contract embodied the terms of the Appalachian agreement. Semet-Solvay officials said they expected to have the mine producing early in March.

Before the mine was shut down, four years ago, it employed 1,200 men and produced 40 railroad carloads of coal a day. Mine officials stated that they expected to use even more men when production gains headway, and would increase output accordingly. Fifty men were employed on Feb. 16 and 150 more were to be taken on early in March.

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Heat Drying Discussed By Illinois Men

Development, construction and operation of the McNally-Vissac thermal dryer was the subject of a paper prepared by Myron W. Miller, engineer, McNally-Pittsburg Mfg. Corporation, and read by Paul W. F. J. Moran, Pyramid Coal Corporation, at a recent meeting of the Illinois Society of Coal Preparation Engineers & Chemists. In operation, a considerable percentage of the water is removed by mechanical action, with the remainder by evaporation.

Calculations for a coal-drying plant and test results on the same plant in operation were among the features of Mr. Miller's paper and are summarized below.

	Calculated	Test
Coal input (¾ in. x ½ mm.), tons per hour	190	175½
Washed moisture content, percent	19.0	19.3
Dried moisture content, percent	9.0	9.2
Furnace heat delivered to hood, percent	65.0	63.0
Temperature in hood, deg. F	541	522
Temperature at fan, deg. F	100	98
Air volume at fan, c.f.m.	108,000	117,000
Infiltration (Leaks), weight percentage	15.0	13.0
Mechanical dewatering, lower limit, percent	15.0	15.4
Fuel required per hour, pounds	4,430	4,700
Heat value of fuel, B.t.u.	12,000	12,200
Electric power required, kw.	.....	224

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Tire Regulations Revised

A new amendment of tire-rationing regulations which may permit manufacturers of rubber-tired haulage equipment to secure tires and also allow mines to replace worn-out casings and tubes was announced by OPA in January. This amendment states that "trucks used wholly within plants and which are not designed to be used on highways, and do not use tires capable of being used on highway trucks," are exempted from the tire-rationing regulations.

New Type Freight Locomotives Installed by C. & O.

Ten new freight locomotives with 2-6-6-6 wheel arrangement, said to be the first of their kind to be used, have been put in service by the Chesapeake & Ohio Ry., the company announced Feb. 7. This design permits use of a larger firebox. Boiler pressure is 260 lb. per square inch and the engines have a sustained speed of 70 miles per hour.

The locomotives, which are known as the Allegheny type, were developed by the mechanical department of the C. & O. under the direction of D. S. Ellis, and were made by the Lima Locomotive Works. In working order each engine weighs 724,500 lb.; with tender, 1,152,000 lb. The tender will carry 25 tons of coal and 25,000 gal. of water. An order for ten more locomotives of this type has been placed with the Lima company.

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Batteries and Hydraulic Controls Occupy Mining-Electricals

Manufacture, use and characteristics of the Edison nickel-iron storage battery was the subject of the January meeting of the Mining-Electrical Group of Southern Illinois, held at West Frankfort, Ill. Guaranteed life of the battery in shuttle-car and mine-locomotive service is 90 months, said John J. Hughes, of the Edison Storage Battery Division, Thomas A. Edison, Inc., St. Louis, Mo., who staged the presentation. Edison recommends 80 to 88 cells for a mine locomotive and 80 cells for a shuttle car. Studies now are under way to make the 80-cell C5 shuttle-car battery interchangeable, as far as size of battery box is concerned, with the 300-amp.-hr. lead battery. An 80-cell D4 battery fits in the same place as the 300-amp.-hr. lead unit but is 6 in. higher, although, stated Mr. Hughes, saving approximately 1,100 lb. in weight.

Hydraulic controls are growing in popularity, declared L. D. Hagenbook, Goodman Mfg. Co., at the February meeting, in listing as advantages in coal cutting and loading ease of operation, convenience (controls may be grouped at one spot), accuracy of movement (very slow and short movements are possible), greater safety, machine positions stay put, the possibility of speed variation, quietness, ability of hose and pipes to negotiate corners, adaptability of the oil tanks for mounting in any vacant spaces, safety-valve overload protection and no frictional interference.

The oil should be 10-W or 10-S hydraulic oil and it must not foam and should have good lubricating qualities. The following, among other things, said Mr. Hagenbook, will help keep a high-pressure system in good order:

1. Use special clean buckets for handling the oil. Do not mix oils. Do not wipe out a bucket with waste; the lint will stop up the filter. Filters offer some difficulties. If you have them there is trouble; if you don't have them there also is trouble.
2. Use kerosene to clean all parts before assembly and to clean oil buckets.
3. Do not tamper with relief-valve settings.
4. Do not use ordinary pipe dope. Use a non-hardening sealing compound and put it on the male fitting.
5. Do not use heavy oil.
6. Do not make the chevron packing tight.

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Research Advisory Board Is Expanded

Addition of two Illinois fuel engineers, Howard A. Herder, of the Sahara Coal Co., and Vernon G. Leach, Peabody Coal Co., to its technical advisory board has been announced by Bituminous Coal Research, Inc. Mr. Leach also is serving on the board's technical executive committee. The board and its executive committee guide the research program sponsored by B.C.R. for the coal industry at Battelle Memorial Institute, Columbus, Ohio, and are in frequent and close contact with the activities of the laboratory.

As members of the technical advisory board, Messrs. Leach and Herder will, with the 22 other fuel engineers in the group, review progress reports and consider new research projects that will advance the use of coal, according to J. E. Tobey, chairman. A semi-annual meeting of the advisory board is tentatively scheduled for March 24.

The current B.C.R. program, sponsored with funds from the coal industry, railroads and manufacturers, includes many problems of immediate importance. A new design of residential heating stove, which is practically smokeless, is under development. This study is jointly sponsored by B.C.R. and a group of 27 stove manufacturers. Preliminary tests show that a new type of residential stoker performs with a thin fuel bed and without forming coke trees. The unit has bin feed and mechanical ash removal.

A widely used type of small forge furnace has been equipped with pulverized-coal burners for heating iron bars in bolt manufacture. Such furnaces normally are gas- or oil-fired.

Two manufacturers of heavy machinery are cooperating in designing a coal-burning internal combustion engine. The absorption of coal-spray oils by porous coals, long a serious problem in the midwest, is being measured and methods for its control are under study. The laboratory and a special committee of the technical executive committee are investigating new types of coal-burning locomotives that would meet all modern requirements.

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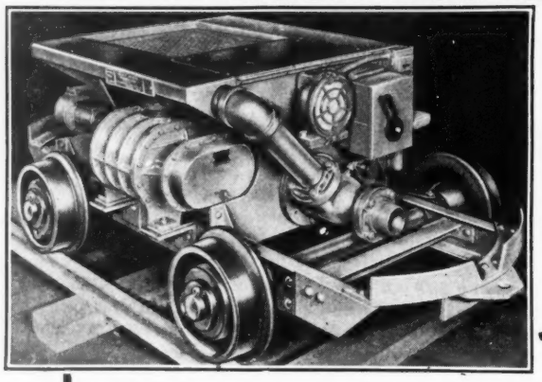
Industrial Notes

General Electric Co., Schenectady, N. Y., has appointed W. A. Wirene as assistant sales manager of the petroleum, mining, and steel mill section of the industrial department. A graduate of Iowa State College, he joined G. E. in 1925 as a student engineer.

Philco Corporation, Philadelphia, Pa., has named J. G. Green as manager of its storage battery division. Following his graduation from Pennsylvania State College he was connected with the Westinghouse Electric & Mfg. Co. for eleven years. In 1935 he established the J. G. Green Co. In January, 1940, he became assistant sales manager of the Louis Allis Co. in Milwaukee, Wis.

ANTICIPATE **ROCK DUSTER** REQUIREMENTS



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• • • •

The LITTLE GIANT machine can be used on entries or areas reached with 100 ft. of hose. Compactly and rigidly built for hard service. Overall height above rail—27 in. Hopper capacity—400 lbs. Weight—1800 lbs. Easily handled on cage.

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The MIGHTY MIDGET machine does a WHALE of a job. It will distribute MORE THAN A TON OF DUST PER HOUR. Can be used on Shuttle Cars or Belt Conveyors. Built for service. Hopper capacity—80 lbs. Weight—280 lbs.

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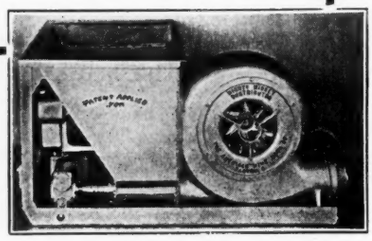

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New Improved Model G Series "Safety-Pull" Ratchet Lever Hoists are built in convertible capacities ranging from ¾ to 15 tons, yet they weigh only 14 to 150 pounds. Greatly increased production facilities make it possible to give immediate service. For further information consult your supply house or write for our Catalog No. GG-5

COFFING HOIST COMPANY

800 Walter Street Danville, Illinois

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SPUR GEARED HOISTS
ELECTRIC HOISTS
LOAD BINDERS
TROLLEYS DIFFERENTIALS

Sawyer Electrical Mfg. Co., Los Angeles, Calif., has appointed George M. Snodgrass as manager of its Eastern sales division, with headquarters at 2110 Terminal Tower, Cleveland, Ohio. He was formerly vice president and sales manager of the Imperial Electric Co., and prior to that sales manager of the electrical division of Fairbanks, Morse & Co.

Allis-Chalmers Co., Milwaukee, Wis., has named Walter Geist, vice president, to head a new department established to coordinate the company's sales policies. This department not only will formulate and put into effect sales policies but also will correlate and unify the selling activities for all the company's 1,600 products with the exception of the tractor department.

Johns-Manville Corporation, New York City, has appointed Dr. C. F. Rassweiler, who joined the company last June as director of research, as a vice president. He will continue in charge of research and development activities which are not largely devoted to converting the full production activity of the company to war use.

Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc., Passaic, N. J., announces that W. L. White, director of laboratories, and H. Snyder, manager of the roll covering and tank lining departments, are now assistant factory managers. H. H. Burrows has been appointed manager of the roll covering and tank lining departments and P. A. Cady will be laboratory manager.

B. F. Goodrich Co., Akron, Ohio, has combined the former mechanical goods and sundries sales divisions and renamed them the industrial products sales division. B. F. Stauffer is now division assistant general manager in charge of Miller plant activities; L. H. Chenoweth, manager, manufacturers' sales; C. F. Conner, manager, distributor sales; C. O. DeLong, manager, operations. John R. Hoover has been appointed manager of synthetic sales, succeeding Dr. H. E. Fritz, recently named company director of research. Herman C. Klein, who has been sales engineer in the synthetic department, succeeds Mr. Hoover.

Crocker-Wheeler Electric Mfg. Co., Inc., New York City, has appointed Donald T. McDonald as manager of sales promotion and publicity, a newly created department established as the basis of a broad scale program of post-war planning. Mr. McDonald formerly was with the Westinghouse Electric & Mfg. Co. as advertising section head at its East Pittsburgh (Pa.) headquarters.

I-T-E Circuit Breaker Co., Philadelphia, Pa., has named Roy J. Wensley, formerly assistant general manager, as general manager. Mr. Wensley went to I-T-E in 1935 to take charge of all modernization projects in production of air circuit breakers and switchgear, after serving some 18 years in engineering capacities at the Westinghouse Electric & Mfg. Co.

Caterpillar Tractor Co., Peoria, Ill., has elevated Harmon S. Eberhard from chief engineer to a vice presidency with administrative direction of research, engineering, manufacturing, industrial relations and training. A new research department has been created headed by C. G. A. Rosen. G. E. Burks has been promoted to chief engineer; J. R. Munro to general factory manager, and Charles A. Woodley to factory manager of the tractor division. These changes are consequent on the sudden death, on Jan. 23, of Thomas John Connor, vice president.

Pomona Pump Co., Pomona, Calif., has purchased the Westco Pump Division of Micro-Westco, Inc., Bettendorf, Iowa. The newly acquired business will be operated as Pomona Pump Co., Westco Division, at 2621 Locust St., St. Louis, Mo., and manufacture continued at the Pomona St. Louis plant. Management and key personnel of Westco will be transferred to St. Louis to continue manufacture and distribution of the complete Westco line.

Morris Machine Works, Baldwinsville, N. Y., announces the election of Stuart J. Saks as president of the company. A graduate of Syracuse University, he joined the company 2½ years ago as assistant to the president, following extensive sales and management experience.

Combustion Engineering Co., Inc., New York City, has named Albert R. Mumford to its research department, under the direction of Henry Kreisinger. A graduate of Massachusetts Institute of Technology, Mr. Mumford's background in fuels, combustion and steam generation covers four years as assistant fuels engineer of the U. S. Bureau of Mines, over 15 years as research and design engineer with the New York Steam Corporation and two years as assistant director

of research of the Consolidated Edison Co. of New York.

CHAIN BELT CO., Milwaukee, Wis., has appointed Pecaut Industrial Supply Co., Sioux City, Iowa, as distributor of Rex construction machinery in that area. Stanley F. Pecaut is manager.

ROLLER-SMITH CO., Bethlehem, Pa., announces that, in order to devote his entire time to his duties as chief engineer, J. D. Wood has resigned as president of the company. Reg Halladay, lifelong friend and financial adviser to the late Colonel Roller, has been elected president. A member of the New York Stock Exchange, he has been a director of the company since 1939. F. A. Judson, who joined the company in September, 1941, as general manager, was elected treasurer.

•

Coal-Mine Accident Fatality Rate Registers Upturn

Accidents at coal mines of the United States caused the deaths of 104 bituminous and 11 anthracite miners in December last, according to reports furnished the U. S. Bureau of Mines by State mine inspectors.

With a production of 46,667,000 net tons, the accident death rate among bituminous miners was 2.23 per million tons mined, compared with 1.95 in December, 1940.

The anthracite fatality rate from accidents in December last was 2.68, based on an output of 4,106,000 net tons, against 3.52 in the corresponding month of the preceding year.

For the two industries combined, the accident fatality rate in December last was 2.26, compared with 2.11 in the last month of 1940.

Fatalities during December last, by causes and states, as well as comparable rates for the twelve months of 1940 and 1941, are shown below.

•

Colorado Mine Blast Kills 34

An explosion at about 10 p.m., Jan. 27, in the Wadge mine of the Victor-American Fuel Co., Mount Harris, Colo., caused the deaths of 34 miners. Among the victims was Tony Skufca, night mine foreman. Four others escaped. The disaster was the worst in a Colorado coal mine since April 27, 1917, when 121 miners were killed in the Hastings mine, Hastings, Colo.

•

News for Arc Welders

A new publication, the *Hobart Arc Welding News*, is being issued by Hobart Brothers Co., Troy, Ohio. The first issue, bearing a February, 1942, date line, contains editorial matter made up from entries in the Hobart Arc Welding News contest, letters to the editor, and articles by welding experts. It is sent free to anyone writing the company's direct mail department and asking to be placed on the magazine mailing list.

UNITED STATES COAL-MINE FATALITIES IN DECEMBER, 1941, BY CAUSES AND STATES

State	Underground										Shaft	Open-cut	Surface	Grand Total
	Falls of Roof	Falls of Face	Haulage	Gas or Dust Explosions	Explosives	Electricity	Machinery	Mine Fires	Other Causes	Total Underground				
Alabama	1	..	1	..	..	2	..	..	..	4	..	..	..	4
Arkansas	..	..	..	..	..	1	..	..	..	1	..	..	..	1
Colorado	3	..	1	..	..	..	..	..	..	4	..	..	2	6
Illinois	7	..	1	8	1	1	..	..	..	18	..	1	1	20
Indiana	3	..	..	..	..	1	..	..	..	4	..	..	..	4
Kentucky	4	..	3	1	1	1	1	..	..	11	..	..	..	11
Missouri	..	..	..	..	..	..	..	..	..	..	..	..	1	1
New Mexico	..	..	1	..	..	..	..	..	..	1	..	..	..	1
Ohio	4	..	2	..	..	..	..	2	..	8	..	1	..	9
Oklahoma	1	..	..	1	..	..	..	..	..	2	..	..	..	2
Pennsylvania (bituminous)	14	..	3	..	..	..	..	..	1	18	..	..	1	19
Tennessee	1	..	..	..	..	..	..	..	..	1	..	..	..	1
Utah	..	..	..	..	..	..	..	..	..	..	..	..	1	1
Virginia	2	..	..	..	..	..	..	..	..	2	..	..	..	2
West Virginia	11	..	5	..	1	..	2	..	..	19	..	..	..	19
Wyoming	1	..	..	..	..	..	..	..	..	1	..	1	1	3
Total bituminous	52	..	17	10	3	6	3	2	1	94	..	3	7	104
Pennsylvania (anthracite)	5	2	1	..	..	..	..	..	..	8	1	..	2	11
Grand total	57	2	18	10	3	6	3	2	1	102	1	3	9	115

DEATHS AND FATALITY RATES AT UNITED STATES MINES, BY CAUSES *

January–December, 1940 and 1941

Cause	Bituminous				Anthracite				Total			
	Number Killed		Killed per Million Tons		Number Killed		Killed per Million Tons		Number Killed		Killed per Million Tons	
	1940	1941	1940	1941	1940	1941	1940	1941	1940	1941	1940	1941
Underground:												
Falls of roof and coal	520	561	1.127	1.116	105	100	2.040	1.840	625	661	1.219	1.186
Haulage	192	188	.416	.374	36	25	.699	.460	228	213	.445	.382
Gas or dust explosions:												
Local	16	22	.035	.044	5	9	.097	.166	21	31	.041	.056
Major	276	66	.598	.131	.....	.....	.....	.....	276	66	.538	.118
Explosives	28	22	.061	.044	8	14	.155	.258	36	36	.070	.065
Electricity	30	41	.065	.081	7	4	.136	.074	37	45	.072	.081
Machinery	40	30	.087	.059	2	.....	.039	.....	42	30	.082	.054
Shaft	12	7	.026	.014	3	3	.058	.055	15	10	.029	.018
Miscellaneous	22	18	.048	.036	6	11	.117	.202	28	29	.055	.052
Stripping or open-cut	22	21	.048	.042	5	5	.097	.092	27	26	.053	.047
Surface	46	48	.099	.095	7	18	.136	.331	53	66	.103	.118
Grand total	1,204	1,024	2.610	2.036	184	189	3.574	3.478	1,388	1,213	2.707	2.177

* All figures subject to revision.

AVOIDS LIGHT FAILURES UNDERGROUND

The bulb in every Portable Cap Lamp is fitted with two major filaments. When one filament burns out, the miner can cut in the second one instantly, by the simple turn of a switch. Thus your men are insured against sudden light failures and you are insured against resultant accidents and loss of working time.

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Cool Caps and Hats Electric Cap Lamps Safety Lamps
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WILMOT BUILDS BETTER BREAKERS

21 Hydrotators Installed in 5 New Anthracite Preparation Plants Built in '41

The Gilberton Breaker (shown above) with Hydrotator preparation units for steam sizes and Chance Cone for domestic sizes, is typical of the modern-type anthracite breakers designed, erected and equipped by Wilmot Engineering Co., Hazleton, Pa.

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Warfare Aspects Emphasized In Mining Course

Modern warfare is emphasized in a course on elements of mining which is being given for the first time this semester by members of the staff of the department of mining engineering, Pennsylvania State College, State College, Pa. Forty-five students are enrolled, many of whom are senior students in the Reserve Officers' Training Corps at the college. Engineer officers of the department of military science and tactics at the college are cooperating in giving the course.

Detection of enemy mining activity, explosives, approved safety practices for handling explosives, practice in using blasting accessories and preparing charges, demolition; construction, and removal of land mines are some of the topics covered. Also to be taught will be mine-gas detection and rescue operations; excavations and their support, and excavating practices and machinery. Each student is required to demonstrate in the laboratory his ability to make up primers and to calculate, lay out, connect and test blasting circuits and charges according to approved safety practices; to place standard timber sets, and to detect gases likely to be encountered in excavations and mines.

Although the course is designed to better prepare students for service in the armed forces, much of its subject matter is usable in peace-time pursuits. Material useful in civilian life covers such items as the use of explosives in land clearing, land reclamation, road construction, ditch digging, pole setting, scrapping machinery; in blasting of oil, gas and water wells; and in pipeline construction.

•

Peach Orchard Control Passes

The stock of the Peach Orchard Coal Co., Henderson, Ky., has been purchased by the Russell Wilson Coal Co., which plans to continue operating the mine under the old name and on the same basis. The mine produces about 123 tons daily and employs 33 men.

•

Fellowships Offered at Rolla

The Missouri School of Mines and Metallurgy, Rolla, Mo., and the State Mining Experiment Station, in cooperation with the U. S. Bureau of Mines, offer several graduate fellowships which are open to graduates who have a Bachelor of Science degree or equivalent who have had the proper training in mining or metallurgy or chemistry and who are qualified to undertake research work. The remuneration for each fellowship is $800 per year for eleven months' work beginning Aug. 1, 1942. Fellows pay fees amounting to $72 per school year. Fellows who have a Master of Science degree may become candidates for the degree of Doctor of Philosophy conferred by the University of Missouri, of which the School of Mines and Metallurgy is a division.

The research work will be on problems pertaining to the work of the Bureau of Mines, its purpose being to undertake the solution of definite problems concerning the mineral industries of the State of Missouri

and the surrounding region. Some fellowships are assigned to the Missouri State Mining Experiment Station under these same general conditions.

Applications, with a certified transcript of college record, a statement of professional experience, photograph, and three letters of recommendation, will be received up to March 15, 1942. Applications should be addressed to Dean Curtis L. Wilson, Missouri School of Mines and Metallurgy, Rolla, Mo.

•

Mine Operates Nearly 5 Years Without a Fatality

New Castle Coal Co., New Castle, Ala., operated 4 years, 8 months, and 20 days, from March 14, 1937, until Nov. 30, 1941, without a fatality. During this period the following record was made: coal mined, 1,007,705 tons; man-shifts, 264,619; man-hours in and around the mine, 1,852,333; man-hours' underground production, 1,361,276.

•

Explains Automatic Stoker Heat

A booklet on "Automatic Home Heating With the World's Thriftiest Fuel, Coal," has been issued by the Bituminous Coal Utilization Committee for Missouri, Kansas and Oklahoma Producers. Stating that an automatic coal stoker is the only item entering into the cost of a home that substantially reduces expenses, the booklet also emphasizes its convenience, cleanliness, healthfulness, and safety. It also answers a list of 20 questions about stoker heat.

Quantities of the booklet may be obtained at $3 per hundred copies from the Sinclair Coal Co., Kansas City, Mo.

•

Trade Literature

BULK HANDLING CONVEYORS—Chain Belt Co., Milwaukee, Wis. Bulletin 410 gives information on and pictorial descriptions of Rex belt conveyors, apron conveyors and bucket elevators.

CEMENT GUNS—Cement Gun Co., Allentown, Pa. Bulletin 220 describes and illustrates the Cement Gun, its parts and operation, together with showing work done in the development of Gunite. A section is devoted to mines.

CENTRIFUGAL CASTINGS—Duraloy Co., Scottdale, Pa. Bulletin 4227-C points out the advantages of centrifugal castings with special emphasis on Duraspun units.

DISBURSEMENT METHODS—Todd Co., Inc., Rochester, N. Y. Booklet entitled "Disbursement Methods—Their Use and Misuse" presents 44 ways to protect your bank account.

DRUM AND BARREL CARRIER—Ernst Magic Carrier Sales Co., Buffalo, N. Y. Folder cites the many operating, construction and application features of the Ernst drum and barrel carrier.

EARTH MOVERS—LaPlant-Choate Mfg. Co., Inc., Cedar Rapids, Iowa. Booklet A-265-675 covers earth-moving, land-clearing and snow-removal equipment. Each model is described

Tough? You said it, brother!

THERE'S NO TOUGHER ASSIGNMENT for any cable than duty in a mine locomotive. The resistor heat plus heat created by the high current densities of constant starting and stopping shortens life of any but the best of cables. Oil, dust and other corrosive influences of mine operation make ordinary cables short-lived indeed.

Deltabeston Mine Locomotive Cables, however, are designed for just such service. They thrive in tough locations. They can take it.

For more information of Deltabeston and Glass Insulated Cable write to Section Y-2103, Appliance and Merchandise Department, Bridgeport, Conn. There is a G-E Merchandise Distributor or a branch of Graybar Electric Co. near you. Get in touch with them for prompt, expert service.

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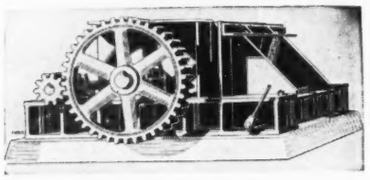

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With this advanced design, in rugged STEELBUILT construction, far more accurate sizing is possible to meet Code requirements through quick adjustability, in a range from ¾" to 8".

Further—real protection is provided by improved Safety Toggle Equipment, which quickly passes Tramp Iron, and instantly returns Breakerplate to crushing position.

Seven (7) sizes afford a capacity range from 50 to 1000 tons per hour.

Send for Bulletin No. 2006.

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generally, with explanations as to size and capacity. The fact that all equipment is built exclusively for use with Caterpillar tractors is emphasized. Sections are devoted to cable-operated scrapers ranging in size from 12 to 33 cu.yd.; to hydraulically operated scrapers of 3.8 to 8.2 yd. and the new CW-10 "Carrimor" 10-cu.yd. scraper. Trail-builders, bulldozers, tampers, rippers and other tools also are included.

EXCAVATOR—Link-Belt Speeder Corporation, Chicago. Illustrated Book 1929 covers the LS-60 heavy-duty ½-yd. crawler shovel, dragline, crane. Illustrations show it at work and how it is built.

GAGES—Manning, Maxwell & Moore, Inc., Bridgeport, Conn. Catalog lists numerous new gages, streamlined gage cases, gages for special services, with a complete listing of Duragages. Illustrations of the various gage testers and accessories required by gage users are included.

HAND CLEANING—Magnus Chemical Co., Garwood, N. J. Bulletin 51 discusses what a hand cleaner should do, safe detergents and scouring agents, germicides and medicaments, lime scums and rinsing, cleaning routines, and protection of hands and arms on the job.

HEAT INSULATION—Ehret Magnesia Mfg., Co., Valley Forge, Pa. Handbook contains comprehensive insulation recommendation section illustrated with 91 drawings and halftones of application details. Data section contains 24 pages of engineering tables, graphs and definitions of technical terms.

INSULATIONS—Johns-Manville, New York City. Catalog Form GI-6A gives information and recommendations on high- and low-temperature insulations for every industrial need from 400 deg. below zero to 2500 deg. F. above.

LAMINATED SHIMS—Laminated Shim Co., Glenbrook, Conn. Booklet traces the development of industrial and mechanical applications of the laminated shim, describing its use for fitting of machine parts in original assembly as well as for making service adjustments.

MAGNET WIRES—John A. Roebling's Sons Co., Trenton, N. J. Catalog J-875 presents the characteristics and advantages of Roevar magnet wires, said to possess maximum resistance to abrasion and solvents, high dielectric strength, high heat resistance and flexibility.

MINE CARS—Irwin Foundry & Mine Car Co., Irwin, Pa. Catalog shows 19 types of mine cars together with wheels and accessories, including the Irwin double-chill disk type wheels.

MOBILE LOADER—Athey Truss Wheel Co., Chicago. Booklet shows applications of the Athey MobiLoader, W4 and Model 8, in action. Mining is among the jobs pictured.

PAINT SELECTOR—American-Marietta Co., Chicago. Folder-booklet, the Valdura Paint Selector, makes conveniently available all information on properties of and all application data necessary to choose properly from 43 paint, enamel and varnish products.

PIPE TOOLS—Beaver Pipe Tools, Inc., Warren, Ohio. Catalog covers complete line of portable pipe and bolt cutting and threading machines, power drives and power units, cutting and threading tools, pipe reamers, vises, sawing vises, grooving and beveling tools, and threading oil.

RUBBER PUTTY—B. F. Goodrich Co., Akron, Ohio. Catalog Section 9765, on Plastikon rubber putty, cites these properties: non-hardening, corrosion-resistant, waterproof, air-tight, no mixing required, quick drying and excellent adhesion; lists the grades, gives directions for use and a large list of applications.

SLUDGE PUMPS—Lawrence Machine & Pump Corporation, Lawrence, Mass. Bulletin 206-2 tells about centrifugal pumps which find wide application in handling sludge in industrial plants where it is necessary to pump liquids containing various solid and fibrous material in suspension.

●

Obituary

PERCY C. MADEIRA, 79, senior partner in Madeira, Hill & Co., anthracite and bituminous operating company, until his retirement in 1935, died Feb. 22 in the Abington Memorial Hospital, Philadelphia, Pa., after a short illness. He started in the coal business in 1880, and five years later formed the firm of Percy C. Madeira & Co., which was changed to Madeira, Hill & Co. when Robert C. Hill joined the firm, in 1893. The firm remained in business until about five years ago. Mr. Madeira was president of the Anthracite Coal Operators' Association from 1916 to 1925. His son Louis C. Madeira 3d is executive director of the Anthracite Institute.

ROBERT FORSYTH, 70, president, Forsyth Carterville Coal Co., and long identified with the coal industry in southern Illinois, died Feb. 21 of a heart attack at his home in Marissa, Ill. He was connected with the development of several large mines.

●

I.M.I. Golden Jubilee

Fifty years of service to the mining industry of Illinois and the nation was marked up by the Illinois Mining Institute in February, and the institute has now set its goal at a thousand members. Third oldest of U. S. mining institutes still functioning today, I.M.I. was founded in 1892, with James C. Simpson, general manager, Consolidated Coal Co., St. Louis, as first president. The question of organizing an institute was first broached at a dinner given to members of the Miners' Examining Board by Mr. Simpson some time in 1891. Formal organization was completed at the State House, Springfield, Ill., Feb. 17, 1892. There were 27 charter members and 107 additional members were elected at the first meeting.

A major feature of institute activities, the annual summer meeting and boat trip on the Mississippi, was inaugurated in 1918. Among its other activities, the society instituted scholarships for the sons of coal men a few years ago. Present institute officials are: president, J. A. Jefferis, Illinois Terminal R.R.; vice president, Carl T. Hayden, Sahara Coal Co.; secretary-treasurer, B. E. Schonthal, B. E. Schonthal & Co.

WHAT'S NEW IN COAL-MINING EQUIPMENT

PROTECTIVE COATINGS, BLACK-OUT BLACK

Carbozite Corporation, Pittsburgh, Pa., offers Carbozite, a protective coating manufactured from Wurtzilite, a pure pyrobitumen ore mined in the State of Utah. Carbozite is recommended by the maker to prevent corrosion of all metals. It also is said to be an excellent waterproofer (being insoluble in water) of wood and concrete, resisting practically all types of acids of various solutions.

It also is made in a mastic and troweling consistency for use on roofs, to seal mine roofs, and prevent corrosion caused by condensation. According to the manufacturer, it has good adhesion qualities and will not crack, peel, chip or craze; and also has high elasticity, since it will expand and contract with rapid temperature changes.

Carbozite also announces a new black-out coating for industrial plant windows and skylights that is said to meet all of the authoritative specifications and recommended practices and features easy removal when danger no longer exists. This coating is not a paint but a smoot-flowing liquid coating, manufactured from a pyrobitumen ore, especially refined and mixed with quick-drying volatile liquid solvents and a secret ingredient which provides complete opacity and an absolutely gloss-free surface.

It can be sprayed or brushed on quickly. Only one coat is required to assure complete protection against light penetration and drying is completed in six to eight hours. The problem of removal is simple, as Black-out Black, according to the manufacturer, is readily soluble in gasoline, kerosene, naphtha or any light petroleum solvent, consequently will dissolve and wipe off glass readily when so desired, without disturbing other painted surfaces.

•

POROUS IRON BEARINGS

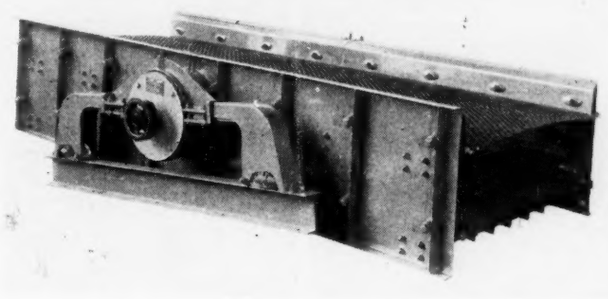
Keystone Carbon Co., Inc., St. Mary's Pa., has added Selflube porous iron bearings to its line of self-lubricating bronze bearings. Interchangeable with porous bronze bearings in most applications, they were introduced to conserve copper.

They are said to have an average porosity of 25 to 35 percent, enabling them to store a large quantity of oil which forms a protective, continuous oil film on the bearing surface. Low friction coefficient, together with self-lubricating qualities, says the manufacturer, prevents excessive temperature, speed reduction, noise and scoring of shaft. Selflube porous iron bearings are supplied in both standard and special shapes.

•

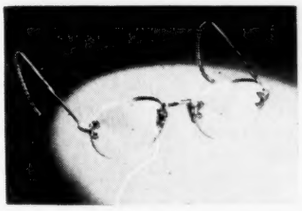
VIBRATING SCREEN

Robins Conveying Belt Co., Passaic, N. J., offers the Style M Robins-Vibrex, a new high-speed unbalanced pulley-type vibrating screen that is said to stand up to overloads. Features designed to save power, lubricant, screen cloth and general maintenance costs include oil-lubricated bearings super-sealed by means of double-action flingers and completly welded splash and dust guards. Inclination of screen, amplitude of vibration and operating speed may all be varied to provide maximum flexibility of operation.



SAFETY SPECTACLES

Tulca Division, Univis Lens Co., Dayton, Ohio, has added a new rimless-type safety spectacle to its eye-protection line. This—the "Supervisor"—spectacle is fitted with the company's special material (not glass) Tulca safety lenses, which do not pit. They come with or without side shields.



They were designed specifically for use by supervisors, checkers, inspectors, maintenance men, and by visitors who are exposed to eye hazards in plants.

•

COMMUNICATION SYSTEM

A new two-way communication system permitting paging messages to be originated from any station and broadcast to all stations, with the added feature of private two-way telephone-type conversation between any two or more points, has been launched by Executone, Inc., New York City. The system accommodates 2 to 70 stations.

Any person desiring to locate and converse with another merely approaches the nearest station and talks into the mouthpiece of a specially engineered telephone-type handset. The trumpet speakers at all other stations announce the call. The person whose name is called approaches the nearest station and removes the handset. Private two-way conversation is then established, all trumpets being automatically silenced.

When the system is in use, either for paging or for two-way conversation, a busy-signal light automatically flashes on all stations. Several types of paging speakers or trumpets are available and can be intermixed in any specified hook-up, depending on the size and noise level of the office or industrial area to be covered. Simple point-to-point wiring makes installation easy and inexpensive.

In addition to paging and two-way conversation this system is available for broadcasting general messages such as orders to all departments.

•

ROTARY CONTROL SWITCH

A new double-break direct-acting rotary switch for control of circuit breakers has been developed by the Roller-Smith Co., Bethlehem, Pa. The switches are insulated for 600 volts and have a continuous current-carrying capacity of 10 amp. Built up of units, each unit consisting of two single break contacts connected in series by means of a jumper, the switch has a spring return arrangement so that when the handle is released the switch returns to the "off" position, opening the contacts. The handle is of the pistol-grip type, facilitating operation of the switch.

•

SAW GUARD

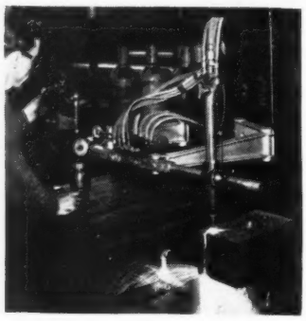
A saw guard said to be completely automatic in operation is offered by the Flohr Mfg. Co., Buffalo, N. Y., which also cites the following features: Can be

mounted to permit use of entire table top area; double-action shields provide maximum protection during all phases of operation; splitter located directly behind saw prevents binding; non-kickback fingers eliminate material climbing saw and striking operator; suitable for stationary or tilting tables; construction eliminates practically all vibrations; steel backbone prevents injury in event of saw breaking; can be furnished for saws up to 30-in. diameter.

•

CUTTING TIPS

A series of oxyacetylene machine cutting tips said to increase the cutting speed of machine torches by 20 to 30 percent and assure cuts of a quality comparable to those obtained with standard tips have been developed by Air Reduction Sales Co., New York City. The Airco "45" high-speed machine cutting tip has a nozzle with a divergent exit portion—a design that makes it possible to eject a narrow high-velocity stream of oxygen practically free of exit turbulence that burns a narrower path, or kerf, through the metal than the conventional cutting tip. As a result of burning away less width of metal in a cut, the Airco "45" cuts with no increase in oxygen consumption.

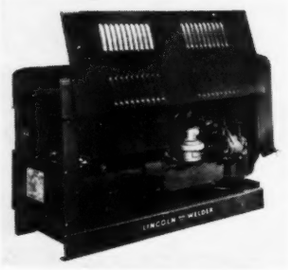


These tips are available in sizes 0, 1, 2, 3, 4, 6, 8 and 10 for cutting metal thicknesses up to 8 in. The tips fit standard machine cutting torches. To increase cutting speeds 20 to 30 percent, says the manufacturer, it is necessary only to substitute one of the new divergent tips for the conventional style tip.

•

ENGINE-DRIVEN ARC WELDER

A new engine-driven arc welder which embodies a new system of engine speed control for maximum fuel economy and minimum engine wear is announced by the Lincoln Electric Co., Cleveland, Ohio. Of 200-amp. size, this new unit is engineered for welding applications of all types and sizes.



With a current range of 40 to 250 amp., the machine can be used for welding of light-gage metal, for repair of cast-iron parts such as engine blocks, for fabrication of machine parts and structures of many kinds, and for hard-facing of worn parts. Of d.c. type, it is said to weld effectively practically all metals and alloys with bare or shielded-arc-type electrodes or with the carbon arc where desirable. Its compactness and light weight make it readily portable and hence suitable for work in remote locations as well as in those readily accessible.

The machine's self-indicating voltage control ("job selector") and current control are said to make it easy for the operator to select any type of arc and any arc intensity to suit the job. They provide continuous selection throughout the range. The "job selector" is situated on the right-hand side of the control panel, with the dial graduated to show the open circuit voltage setting that may be obtained.

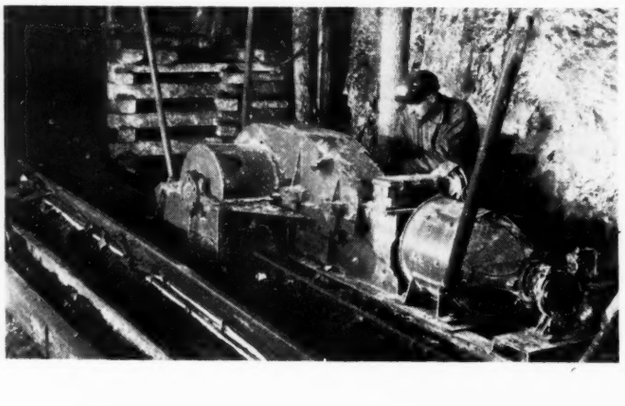
•

AUTOMATIC CAR SPOTTER

A new automatic car spotter developed by the Brown-Fayro Co., Johnstown, Pa., is designed for use where a single-belt conveyor serves a large number of working places and where coal may be loaded into mine cars at rates as high as 6 tons per minute. Using Westinghouse electric controls, a barney, attached to the endless rope, operates in guides set between the rails. Under the control of the operator and the limit switch, this barney is pulled forward exactly one car length, then is automatically stopped and pulled back one car length.

On the forward motion the barney engages a lug on the car and pulls the entire trip with it, stopping an empty car exactly under the conveyor discharge. Thus a constant supply of empty cars, placed at the loading point, permits the conveyor to pour out a continuous stream of coal without shutting down to change ropes.

The car spotter is rated 12,000 lb. rope pull and is geared for a slow hauling speed of 40 ft. per minute; a fast hauling speed of 60 ft. per minute, and a return speed of 80 ft. per minute. The barney can be returned two car lengths instead of one at the discretion of the operator. Quick starting and stopping is accomplished by automatic acceleration and dynamic braking.



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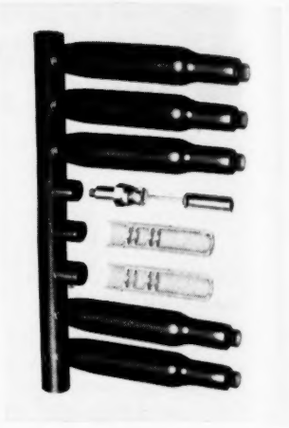
INDUSTRIAL NETWORK CONNECTOR

A new type of insulated connector designed especially for use in the junction, or limiter, boxes of industrial secondary networks has been announced by Burndy Engineering Co., New York City. The connector, a special Burndy mole equipped with molimeters, is said to provide a simple and compact means of interconnecting the ties of the network, joining the ties to the network transformers, and tapping off any number of loads.

The special mole consists of a central connecting body surrounded by a molded insulating jacket and containing any number of cable outlets. Because of this flexibility in the number of outlets, says the manufacturer, extra taps can be added without disturbing existing connections. To isolate faulty ties or faults in any of the joining cables, each outlet is provided with a molimeter—an easily installed fusible element inclosed in an arc-proof chamber. Cable connections to the



molimeters are quickly and easily made by means of the Burndy Hypress.

In general practice each limiter box contains four of the mole assemblies, three with limiter protection for the three phases of the circuit and a fourth—the neutral—which does not require limiter protection. The new mole is furnished in many types, two of the more popular being Types ZMEJ and ZMEH. Type ZMEJ has extended ends which enable the connector to be supported on grooved insulating strips mounted in the limiter box. Type ZMEH, on the other hand, has tapped holes in each end of the main conducting body and is fastened to the insulating support by means of bolts.

•

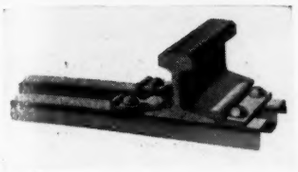
ELECTRIC HOIST

Chisholm-Moore Hoist Corporation, Tonawanda, N. Y., offers the new CM Meteor heavy-duty electric hoists, for which it bespeaks the following features: streamlined design that provides compactness and eliminates excess weight; aeroplane-type cooling fins that quickly dissipate the heat generated by gears and load brake; fully inclosed weatherproofed design that permits the hoist to be used indoors and out; and, for extra safety, fully inclosed safety-type hook blocks and a specially designed electrical system that permits only 110 volts to pass through the pushbutton station. Units are available in capacities of ½ ton and up.

•

IMPROVED MINE TIE

The rapid spread of mechanized mining equipment has caused mine operators to increase the weight of rail sections used in rooms, in order to carry the heavy load of mechanical cutters, loaders, and the larger cars. To take care of this situation, Bethlehem Steel Co., Bethle-



lehem, Pa., has brought out a new tie, called the No. 5 steel mine tie. In addition to its heavier and stronger section, according to the manufacturer, the new tie has a sturdier clip and a larger rivet, to take care of the extra stresses imposed on these parts by the heavier equipment.

The principal dimensions of the new tie are: width, 5½ in.; weight per foot, 5 lb. The sturdier clips used are ⅜ in. thick, compared with the 5/16-in. clip section formerly used. The length of the clip body also is greater to accommodate a ⅝-in.-diameter rivet with full-size head. The tie is recommended for use with 40-lb. rails or wherever conditions demand a tie of greater strength and rigidity. It also can be furnished with proper size clip and rivet to accommodate 30-lb. rails.

•

SPECTACLE-TYPE GOGGLE

A new comfort-bridge feature designed to make spectacle-type goggles easy and comfortable to wear is announced by the Chicago Eye Shield Co., Chicago. The bridge is described as a single unit molded out of nonflammable plastic material including wide-bearing jumbo pads which distribute the weight evenly and float the frame without undue pressure across the bridge of the wearer's nose. Both the bridge and pads are self-adjusting to varying nose widths.

The frame is of lightweight design, yet retaining every element of strength, according to its designers. The arch bridge is high and engages the eye wires at four different points by means of forked ends, assuring unusual strength and rigidity. These spectacles are offered in three bridge widths — narrow, medium and wide — and are furnished with 50-mm. lenses or the newer oval frames in Cesco hardened lenses which meet all government specifications.

•

BRUSH PROTECTOR

Wisconsin Laboratories, Inc., Milwaukee, Wis., announces a new method of storing and careing for paint and varnish brushes. The method, known as Protexem, employs the use of an airtight metal container providing an atmosphere of solvent vapors in place of the usual liquid bath.

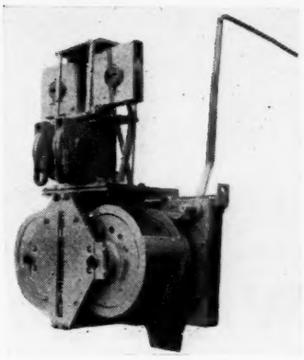
The vapors are heavier than air, lifting the oxygen out of the container. This is said to prevent the drying and hardening of the paint or varnish in the brush. A further action contingent upon the solvent action of the vapor on the oil, gum or resin in the brush keeps the brush from getting hard. According to the manufacturer, brushes which have been hard for years may be completely softened in a few days, making them as good as new; there is no deteriorating action on the bristle or setting of the brush.

•

CRANE, HAULING UNIT, CONTROL UNIT

Two cranes, the L20 and L40, have just been released for distribution by R. G. LeTourneau, Inc., Peoria, Ill. Developed for handling bulky materials, these cranes are said to give 20,000 lb. lifting capacity a horizontal distance of 20 ft. 6 in. out from axle center in upright position. Available in 20- and 40-ft. boom lengths, they are operated from any size tractor, and have all-welded box-type construction of special steels, rubber tires to permit travel over concrete surfaces and give ample flotation for working in soft, mucky conditions.

LeTourneau also offers the W210 Tournatrailer with a heaped capacity of 17 cu.yd. This unit has been designed with flared side and end walls to give the bowl an 8-ft. x 12-ft. 8-in. opening at the top for quick, accurate loading by big dragline or shovel. It is powered by the 150-hp. Super C Tournapull for fast pickup and travel, quick spotting and maneuvering, has four forward speeds and reverse,



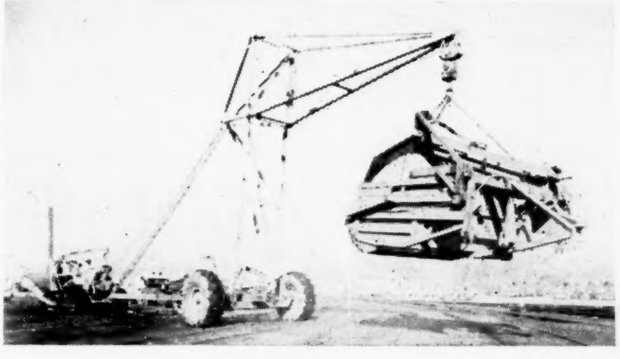
and rides on two 21 x 24, 20-ply tires.

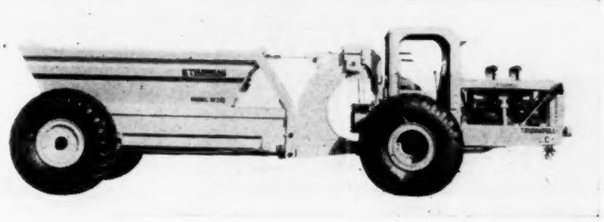
The R6-7-8 power control unit is another LeTourneau offering. This two-drum unit is designed for interchangeability. The face plate is drilled to allow easy mounting on either D6, D7 or D8 "Caterpillar" tractors. These advantages are claimed for the unit by the manufacturer: Its strong line pull of 5,000 lb. enables it to handle the largest loads easily; has strong, rugged case; few moving parts; large brakes and clutches; fast heat dissipation through large exposed area on brake drum; large cable capacity; long cable life because of large drum area; strong line pull.

•

POWER PLANTS

Newly designed Katolight power plants are now presented in the 7½- and 10-kw. sizes at 1,200 or 1,800 r.p.m. and in the 15-kw. sizes at 1,800 r.p.m. by the Kato Engineering Co., Mankato, Minn. Engine is of the 4-cylinder, 4-cycle, water-cooled type with radiator, fan and centrifugal pump; includes exhaust and muffler, governor with variable speed control, pressure lubrication system with gear-type pump and pressure gage, oil filter, gasoline carburetor, screen-type air cleaner, 12-gal. fuel tank, 7-qt. oil capacity, 4 gal. water capacity, gasoline filter, high-tension magneto with impulse starter coupling, spark plugs, ignition cables and switch all inclosed in heavy-gage sheet-metal housing; shielded for radio operation.





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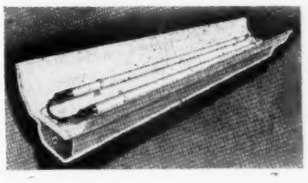
FLUORESCENT LIGHTING

Benjamin Electric Mfg. Co., Des Plaines, Ill., has introduced the new "RF" lighting equipment, which it states provides more light for power consumed, solves the flicker problem; assures quicker, surer starting, and lowers installation and maintenance costs. Low wattage requirements, says the manufacturer, make it possible to obtain higher lighting levels with existing wiring.



These units are available in either single or twin lamp types. Both are open-end models of special porcelain enamel. The units require 85-watt RF lamps, are 65¼ in. long, and are said to embody constructional features facilitating installation and maintenance.

•

ARC WELDER CONTROL

Improved and simplified design of its system of dual continuous control for arc-welding machines which eliminates the need for meters showing volts and amperes is announced by the Lincoln Electric Co., Cleveland, Ohio. These welders have both job selector and current control calibrated and equipped with dials which indicate the type of work and number of amperes for each and every setting—both continuous.

Advantages of the new design according to the manufacturer, include: (1) ability to set and read the current from the dial; (2) elimination of trouble and expense resulting from meter breakage; (3) elimination of meter inaccuracy after a few months' use in service in the field; (4) availability of positive polarity reversal; (5) ability to verify polarity quickly by noting position of switch handle.

A WAR MESSAGE
to
ALL EMPLOYERS
★ From the United States Treasury Department ★

WINNING THIS WAR is going to take the mightiest effort America has ever made—in men, in materials, and in money! Every dollar, every dime that is not urgently needed for the civilian necessities of food, clothing, and shelter, must, if we are to secure final Victory, be put into the war effort.

An important part of the billions required to produce the planes, tanks, ships, and guns our Army and Navy need must come from the sale of Defense Bonds. Only by regular, week by week, pay-day by pay-day investment of the American people can this be done.

This is the American way to win. This is the way to preserve our democratic way of life.

Facing these facts, your Government needs, urgently, your cooperation with your employees in *immediately* enrolling them in a

PAY-ROLL SAVINGS PLAN

The Pay-Roll Savings Plan is simple and efficient. It provides, simply, for regular purchases by your employees of United States Defense Bonds through systematic—yet voluntary—pay-roll allotments. All you do is hold the total funds collected from these pay-roll allotments in a separate account and deliver a Defense Bond to the employee each time his allotments accumulate to an amount sufficient to purchase a Bond.

The Pay-Roll Savings Plan has the approval of the American Federation of Labor, the Congress for Industrial Organization, and the Railroad Brotherhoods. It is now in effect in several thousand companies varying in number of employees from 3 to over 10,000.

In sending the coupon below, you are under no obligation, other than your own interest in the future of your country, to install the Plan after you have given it your consideration. You will receive—1, a booklet describing how the Plan works; 2, samples of free literature furnished to companies installing the Plan; 3, a sample employee Pay-Roll Savings authorization card; and 4, the name of your State Defense Bond administrator who can supply experienced aid in setting up the Plan.

To get full facts, send the coupon below —today! Or write, Treasury Department, Section B, 709 Twelfth St., NW., Washington, D. C.

HOW THE PAY-ROLL SAVINGS PLAN HELPS YOUR COUNTRY

1. It provides immediate cash now to produce the finest, deadliest fighting equipment an Army and Navy ever needed to win.
2. It gives every American wage earner the opportunity for financial participation in National Defense.
3. By storing up wages, it will reduce the current demand for consumer goods while they are scarce, thus retarding inflation.
4. It reduces the percentage of Defense financing that must be placed with banks, thus putting our emergency financing on a sounder basis.
5. It builds a reserve buying power for the post-war purchase of civilian goods to keep our factories running after the war.
6. It helps your employees provide for their future.

MAIL THIS COUPON NOW

Treasury Department, Section B
709–12th St., NW.
Washington, D. C.

We want to do our part. Please rush full information regarding the Pay-Roll Savings Plan.

NAME .....
POSITION .....
COMPANY NAME .....
ADDRESS .....
NUMBER OF EMPLOYEES .....

GPO 16—25943-1 Form No. DSS-BP-2

MAKE EVERY PAY-DAY . . . BOND DAY!
U. S. Defense BONDS ★ STAMPS

THIS space is a contribution to NATIONAL DEFENSE by COAL AGE

NOW I WON'T HAVE TO CALL YOU EVERY TIME THERE'S A SHORT OR OVERLOAD.
THAT'S RIGHT! JUST TURN THE HANDLE AND THE POWER'S BACK ON YOUR MACHINE.
GENERAL ELECTRIC
AIR CIRCUIT BREAKER

Here's Why YOU'LL Like This New G-E Removable Breaker

WITH this *3-minute* breaker you can re-establish service after temporary faults in less than *one* minute. You can remove and inspect the breaker unit—in safety, away from live parts—in less than *two* minutes. And where load conditions have changed, you can interchange breaker units in less than *three* minutes.

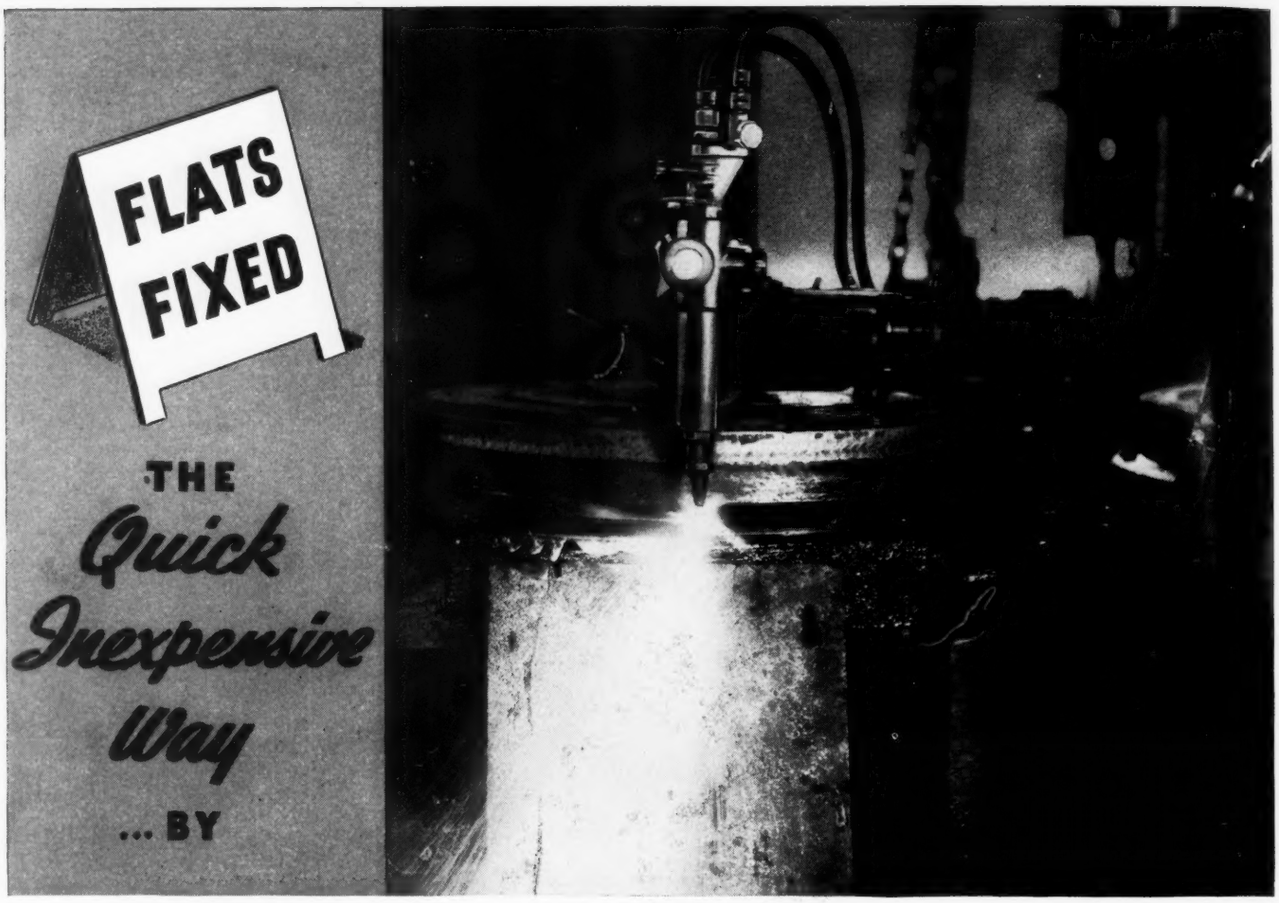
This air circuit breaker is built to meet today's demands for quick installation and provide dependable protection for defense production lines. Its new features include a simple, ingenious method of mounting and a convenient modernized enclosing case, which combine to give you a removable dustproof breaker that is easy to install, easy to operate, and easy to inspect.

Give your production, equipment, and personnel complete protection. Install these breakers in lighting, power, and motor circuits—up to 600 volts. They will protect both the circuit wiring and the apparatus connected to the circuit. A new pictorial booklet (GEA-3600) tells where and how to use them. For a copy, write the G-E office nearest you, or address General Electric Co., Schenectady, New York.

GENERAL ELECTRIC

860-21-7500

THE BREAKER WITH THE DISCONNECT FEATURE



AIRCO FLAME CUTTING

Far simpler, much faster, at a fraction of the cost—this in short describes the new Airco method of repairing mine locomotive tires. The locomotive truck is turned on its side and the false flange—resulting from constant wear—is cut from the tire by an Airco No. 10 Radiagraph. In less than 5 hours the locomotive is returned to active service, the tires good as new. Compare this with the conventional repair method—where trucks are removed from the locomotive, tires are preheated, then the flange is ground down or the wheel proper rebuilt to its original shape by welding.

This is but one of the numerous profitable coal mine applications which utilize the Airco oxy-acetylene flame and electric arc. Others include welding for greater strength and longer life, cutting for fabrication or repair, flame hardening for longer wear. If you are not taking full advantage of these processes, we will gladly help you determine if they can be profitably applied to your jobs.

Air Reduction

General Offices: **60 EAST 42nd ST., NEW YORK, N. Y.**

IN TEXAS
MAGNOLIA-AIRCO GAS PRODUCTS CO.
General Offices: **HOUSTON, TEXAS**
OFFICES IN ALL PRINCIPAL CITIES

AIRCO WILSON

Anything and Everything for **GAS WELDING or CUTTING and ARC WELDING**

3 ways to make your Wire Rope dollar go farther...conserve steel tonnage too

(No. 9 in a series of informative articles for wire rope users prepared by the Macwhyte Wire Rope Company. Previous articles in this series are available on request on your company letterhead.)

1 Buy PREformed; it's best, costs less

There have always been sound reasons for buying PREformed wire rope. Careful tests time and again have proved it gives better service than non-preformed, costs less in the long run, saves time because fewer shutdowns are necessary for replacements.

Fig. A — PREformed ropes are free of internal stress, have high fatigue resistance.

Today there's another reason why it's most important to buy PREformed: by doing so you help national defense.

It takes just as long at the steel mill to make steel for non-preformed as for PREformed wire rope. Yet PREformed will outlast ordinary wire rope on most jobs. When you buy Macwhyte PREformed, therefore, you're helping conserve not only steel which America greatly needs, but also the time of those who make it.

2 Install Rope Carefully

It's so easy to kink or twist rope when installing in a hurry. Such "haste makes waste." Kinking and twisting definitely shortens rope life.

With reasonable care and speed you can prevent both. Here are some simple suggestions on unreeling and uncoiling rope . . . operations where both kinking and twisting are apt to occur.

CORRECT WAY

Unreeling—The reel should be revolved and the rope taken off the way it is put on the reel. Illustration No. 1 shows one method—put a shaft through the center of the reel and jack it up so that the reel will revolve freely. Pull the rope straight ahead, keeping it taut to prevent it from loosening up on the reel. A board held against one flange may be used as a brake to keep the reel from revolving too fast.

Uncoiling—Roll the coil along the ground so the rope lies straight as shown in Illustration No. 2. There will be no twist or kink in the rope if these instructions are followed.

INCORRECT WAY

Illustrations 3 and 4 show incorrect ways of unreeling and uncoiling. Notice that the reel and coil cannot revolve and therefore the rope is twisted as each turn is taken off.

3 Inspect Your Ropes Regularly

Once wire rope is on their equipment many users overlook the value of regular inspection. Such negligence is costly. It can be avoided by regular inspection which takes far less time, is much less expensive than too frequent buying and replacing for lack of knowledge of their condition.

Pictured here are a few of the most common "Wire rope enemies" which, if *not* eliminated or kept under control, can easily reduce the service life of your rope as much as 50%. Also given here are suggested methods of avoiding these dangers.

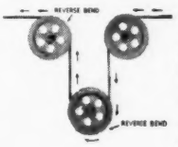


Fig. B — Reverse bends — Years of experience and many tests have proved that reverse bending and excessive wire fatigue reduce rope life as much as 50%.

Where reverse bending cannot be eliminated, use the largest sheaves possible and place them as far apart as possible. By getting the MAXIMUM distance between reverse bends, you reduce fatigue—provide longer service.

Fig. C — Sheaves too small. This rope was forced to travel continuously over sheaves whose diameters were too small. Frequent inspection would have shown this danger. A change to a larger sheave would have solved the problem. (Note: PREformed wire rope would have lasted much longer in this case.)

Fig. D — Drum abrasion and abuse caused this. The rope was scuffed over and over against previous wraps on a flat-faced drum. This could have been prevented by even winding and grooved drums.

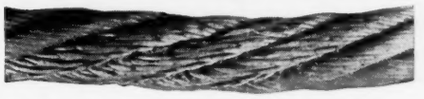


Fig. E — Kinking caused this. This dog-leg, or kink, was finally straightened out . . . but notice the uneven wear at the point where the kink had been. Proper handling during installation could have prevented this. Beware of dog-legs! They're expensive.

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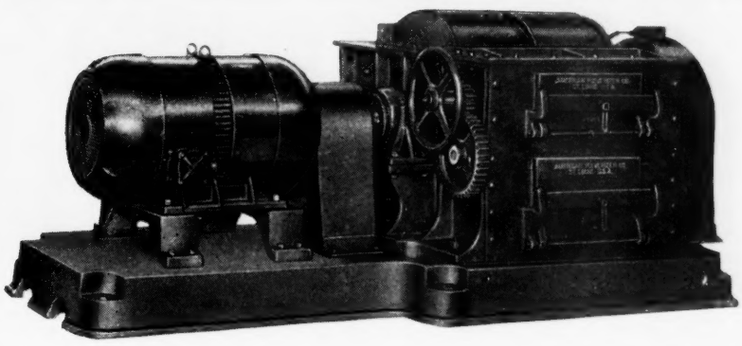

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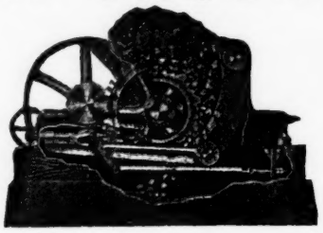

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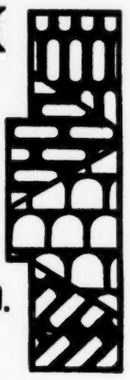

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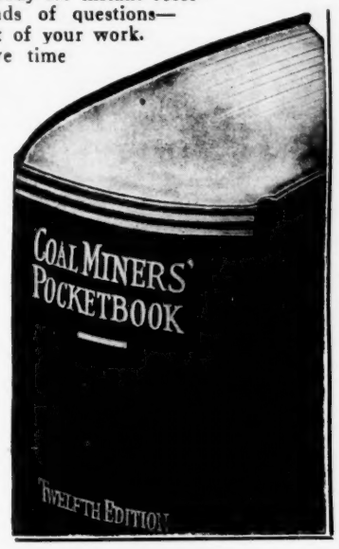

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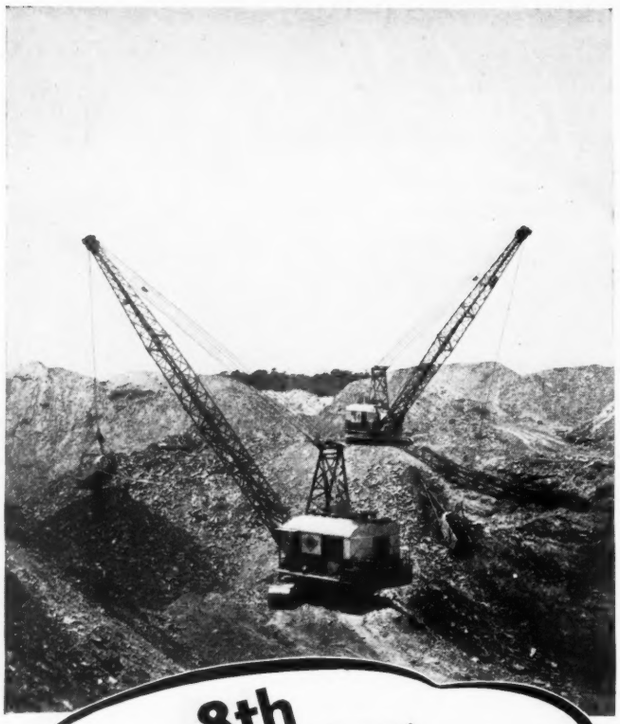

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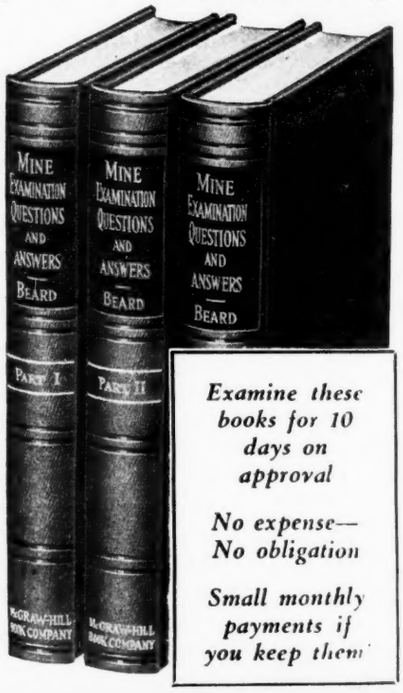

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(7) Steam 66 ft., 300 ft., 600, 1000 & 1940 ft.
(12") Belted, 360, 676, 870, 1000, 1300 ft.
(12) Diesel 105, 315, 520, 676 & 1000 ft.
(6) Electric, 1300, 1500, 2200, 2600, 5000 ft.
(14) Gasoline, 110, 160, 220, 310 & 370 ft.

COAL CRUSHERS:
Jeffrey Single Roll 18x18, 24x24 & 30x30
Link Belt 26x24 Double Roll Crusher

HYDRAULIC CARWHEEL PRESSES:
100 Ton, 150 Ton, 300 Ton, 300 & 400 Ton Caldwell - Niles - Wood - Watson Stillman

RUBBER CONVEYOR BELTS:
1000′ 60", 600′ 30", 300′ 20", 1600′ 42", 900′ 48", 1450′ 36", 1200′ 24", 900′ 18", 600′ 16", 350′ 14".

CONVEYOR PARTS:
Idlers, Head & Tail Pulleys, Steel Frames, Tripper, etc., 14 In., 60 In. Large Stock here.

SYNC. MOTOR GENERATORS & ROTARYS:
100 KW Ridgway 1200 RPM 3/60/2300/250-275
150 KW G.E. 1200 RPM 3/60/2200-250-275
200 KW Ridgway 900 RPM 3/60/2200-250-275
3—100 KW G.E. 275 v. 1200 RPM Rotarys

STORAGE BATTERY LOCOMOTIVES:
2½ ton Whitcomb 24 ga. New Batteries
2—4 ton G.E. 30 in. ga.
3—5 ton Mancha 30 in. ga.
4—5 ton G.E. 36 in. ga.
3—7 ton Goodman 36 ga. Battery & Trolley
8—6 ton Baldwin Westgh. 42 ga. & 36 ga.

TROLLEY LOCOMOTIVES:
2½ ton Westinghouse 24 ga.
4—6 ton & 3—5 ton Goodman 36 ga.
3—6 ton Goodman 30 ga.
4—6 ton Goodman 42 ga.
5—6 ton Westinghouse 42 ga.
2—8 ton Goodman 36 ga.
10 ton Goodman 42 ga. & 13 ton Jeffrey

VIBRATING SCREENS:
9 Tyler Hummer 3x6, 4x5, 4x8 & 4x10
2 Robins Gyrex 4x8½
4x12 Niagara, 3x8 L. B., 5x6 Simplex

CARS:
120—4 ton 42 ga. S.D. Mine Cars
60—Western 16-20-30 yd. Side Dump

SHOVELS, CRANES & DRAGLINES:
3 W 90′ Boom, 6 W 160′ Boom, Model 6150, 175′ Boom. Diesel. Monighan Walkers
1 yd. K 30 Link Belt 50′ Boom Crane
2 yd. Page 70′ Boom Diesel Dragline
1¼ yd. Marion 450 Elec. Shovel
1½ yd. Lima Diesel Shovel & Dragline
2 yd. Link Belt Elec. Shovel & Dragline
25 ton Browning 50′ Boom Loco. Crane
7 Conway 20A, 30A, 50A, 60 & 75 Muckers

MINE LOADERS:
Junior Joy 36 ga. Low Pan
Conway 20 Mucker
3—5 BU & 7 BU 36 or 42 ga. Joy
9—Goodman 260 & Jeffrey 44L

MISCELLANEOUS:
5′x160′ Traylor Rotary Dryer
100 HP G.E. 3/60/440 v.-900 RPM Elec. Motor
6 Goodman 12CA & 12DA 6 ft. Cutters
9x8 Sullivan Mine Compressor
Clamshell Buckets ¾, 1, 1½ & 2 yd. Cap.
30 ton & 12 ton Vulcan Std. Ga. Gas. Loco.

WANTED TO BUY:
Complete Mines—M.G. Sets, Locomotives, Compressors, Conveyors, Cranes, Crushers & Rotary Converters. Also Rails, Screens, Pumps, Cars, Mine Loaders & Mining Machines.

Tidewater Equip. & Machy. Corp.
305 Madison Ave. New York, N. Y.

FOR SALE

HOISTS

1—1300 H.P. Vulcan Shaft Hoist, with cylindrical-conical 10′ drum.
1—900 H.P. Vulcan Double Drum Slope Hoist.
1—700 H.P. Allis-Chalmers Slope Hoist, good for 7000′ of 1⅛" rope.
1—300 H.P. Lidgerwood Slope Hoist, drum good for 5000′ of 1" rope.

ROTARY CONVERTERS

1—200 KW General Electric Rotary Converter.
1—500 KW General Electric Rotary Converter.
Both late pedestal type, form P, 250/275 volt DC, with switchboards and switchgear, including transformers for 2300 volt.

Frank J. Wolfe

MINING MACHINES

25—CE-7 AC Sullivan Shortwall Mining Machines. Just taken out of service—excellent condition.
15—5-BU Joy Loading Machines, 250 volt, 42" gauge. In the very best of condition. Ready to go right into service.
1—Practically new Jeffrey 29-L Track Cutter, used less than six months.

LOCOMOTIVES

We have several 6, 8, 10, 13 and 15-ton completely rebuilt locomotives, 250 and 500 volt.
We specialize in Buying Complete Mines That are Going Out of Business or from Receivers in Bankruptcy, Administrators of Estates, etc. -'.

OUR FINANCIAL RESPONSIBILITY IS YOUR GUARANTEE OF SATISFACTION!

COAL MINE EQUIPMENT SALES CO.
★ WE BUY & SELL USED & REBUILT EQUIPMENT FOR MINES
Offices & Warehouse: **TERRE HAUTE, INDIANA**

FOR SALE
IMMEDIATE DELIVERY

10—Sullivan CE 7 Short-wall cutting machines 42" gauge 7½′ cutter bars, 220 volt AC.

All complete with cable and tools. In good operating condition.

10—JOY 5 BU LOADING MACHINES, 250 volt, 42" gauge 52" height, 35 H.P. motors; all in first class operating condition, can be seen in operation in Central Illinois, loading large tonnage. IMMEDIATE DELIVERY.

MINING MACHINERY SALES CORP.
1214 Fisher Building CHICAGO

IN OUR STOCK

Rotary Converter Equipment
100 KW—250 or 275 volts d-c.
200 KW—600 volts d-c.

Rotary Transformers
Several banks in stock

Outdoor Switches (3-pole, group oper.)
TA-2, 400 ampere, 37000 volt, G.E. disconnecting switch
TA-1, otherwise ditto, except with horn gap and choke coil attach.

Lightning Arrestors (outdoor type)
Three 37000 volt G.E.

Grid Resistance—Several banks

Air Compressor
7x7" Ingersoll-Rand, portable

Chain Blocks—Two 5-ton

Motors & Control—both AC & DC

Inquiries solicited

R. H. BENNEY EQUIPMENT CO.
5024 Montgomery Road Norwood, Ohio

NEED DUMP CARS?
IMMEDIATE DELIVERY
16, 24-yd. Koppel 24, 16-yd. Western
9, 20-yd. Koppel 15, 16-yd. Kilbourne & Jacobs
3, 20-yd. Western 62, 12-yd. Western
Illustrated specifications available
OTHER TYPES OF CARS TOO
Also Locomotives, Cranes, Shovels, Etc.
IRON & STEEL PRODUCTS, INC.
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"ANYTHING containing IRON or STEEL

WE BUY AND SELL
MOTORS
TRANSFORMERS
MOTOR GEN. SETS
OIL SWITCHES
AIR CIRCUIT BREAKERS
ELECTRIC EQUIPMENT CO.
347 N. Clinton Ave., Rochester, N.Y. Tel: Main 252

FOR SALE

1—Used **Ridgeway Motor Generator** Set 100 KW 250-275 volts DC, 2200 volts AC—3 phase—60 cycle, A-1 condition.
1—Used 10 HP **Westinghouse** SK motor 230 volts DC 1150 RPM.
1—Used 5 HP **Westinghouse** SK motor 230 volt DC 1150 RPM.
1—Used **G.E. motor** type CE 230 volt 5 HP open 3½ HP closed 1725 RPM.
1—Used 10 HP **G.E. motor** compound wound 230 volt DC 1700 RPM.
1—Used **Clyde Iron Wks Hoist** with 60 HP motor.
1—Lot new **trolley frogs, hangars** and **clamps.**
1—New **Weinman 3" bronze Centrifugal pump body,** lower section without top. (spare)

CRAWFORD MACHINERY COMPANY
Empire Bldg. Pittsburgh, Pa.

NEW "SEARCHLIGHT" ADVERTISEMENTS

received by March 26th, appear in the April issue, subject to space limitations.

Address copy to the Departmental Staff

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330 West 42d St., New York City

REBUILT EQUIPMENT—READY TO SHIP

MINING MACHINES

CE-6 Sullivan 250 v. DC.
CE-7 Sullivan Shortwall 250 v. 6' bar
CE-7 Sullivan Shortwall A.C. 220/440

MINE LOCOMOTIVES

4½ ton West. 250 v. 36/42" ga.
5 ton West. 903-250 vdc.
6 ton Atlas 220 v. 3 ph. 60 cy.
10 ton Milwaukee GASOLINE

ROTARY CONVERTERS

150 kw. West. 250 v. 1200 rpm 2200/3/60.
150 kw. G.E. HCC 250 v. 1200 rpm. 440/3/60.

M.G. SETS—3 ph. 60 cy.

110 kw. Crocker Wheeler 250 v. 720 rpm., 2200 v. A.C. ind.
150 kw. Crocker Wheeler 250 v. 550 rpm. 2200/440/220 v. syn.
150 kw. Crocker Wheeler 250 v. 600 rpm., 220/440 v. ind.
150 kw. Crocker Wheeler 250 v. 600 rpm., 220/440 v. syn.

TRANSFORMERS

3—10 kva. Pgh. 2200-220/110/1/60
3—20 kva. G.E. 2200 v. 220/110-1/60.
3—37½ kva. West. 22000-2200/1/60
1—50 kva. Burke 2200-110/3/60
2—75 kva. Burke 2200-110/3/60
1—100 kva. West. 2200-220/110v./1/60

SPEED REDUCERS

Thomas, 3 HP ratio 100:1
Cleveland 600 AT 10 HP. ratio 90:1

LATHES

22"x10' Putnam Lathe

SHAKER SCREEN

La Del Shaker Screen 62¼" wide, 8' long.

JOY JR. LOADING MACHINE

1—12 B.U. 250 v. 42" ga.

HOISTS

25 HP. Thomas 18" face 20" dia.
40 H.P. single drum AC 220/3/60.
100 H.P. Lidgerwood 2 drum AC or DC Motor

SLIP RING MOTORS

3 ph. 60 cy.

HP.	Make	Speed	Type
700	G.E.	393	MT-432
400	West.	1170	CW
260	Burke	600	EM-65
200	West.	690	CW-956A
100	West.	1750	

230 V. D.C. MOTORS

HP.	Make	Speed
125	G.E.	1750 rpm.
100	West.	250
85	G.E.	530
75	West.	1700 rpm.
75	West.	475
75	Reliance	1750
50	West.	975 rpm.
50	West.	1700 rpm.

A.C. GENERATORS—3 ph. 60 cy.

75 kw. G.E. 220 v. 900 rpm.
219 kva G.E. 2200/440/220 v. 200 rpm.

DC GENERATORS—250 Volt

80 kw. West 265 rmp.
100 kw. G.E. 550 rpm.
150 kw. Crock. Wh. 550 rpm.

A. C. Motors—3 ph. 60 cy.

HP	Volts	Make	Type	Speed
150	220/440	West.	CS	1800
150	2300	West.	Syn.	900
200	2200/440/220	West.	CS	250
200	2200	G.E.	IK-15	1200
200	220/440	West.	CS	1200
200	220/440	West.	CS	720
200	220/440	West.	CS	600
225	2200	West.	CS	900
250	220/440	West.	CS	900
250	2200	West.	CS	1200
275	2200	West.	CS	1800
300	220/440	West.	CS	1150
300	2300	West.	CS	1200
300	2200/440/220	West.	CS	450
350	2200/440/220	West.	CS	450
400	2200/440/220	West.	CS	500
450	2200/440/220	West.	CS	600
500	2200/440/220	West.	CS	720
600	2200/440/220	West.	CS	900

CENTRIFUGAL PUMPS

4x3 Harris, 320 rpm.
4x4 Weinman, 500 gpm.
6x6 Gould, bronze, 1300 gpm.
8x8 Weinman, bronze.
5x6 Hayton, 750 gpm.
6x6 Manistee, 750 gpm.
6x6 American, 1000 gpm., bronze.
6x6 Weinman, 1000 gpm.

ENGINE GENERATOR SETS

50 kw. West. 220/3/60 Ames STEAM.
75 kw. G. E. 250 V. D.C. Skinner STEAM.
75 kw. G.E. 220/3/60 Bessemer GAS.
80 kw. West. 250 V. Belted 110 Bessemer GAS.
100 kw. Fair Morse 2400/3/60 belted DIESEL.
175 kw. G.E. 2200/3/60 Ridgway STEAM.
175 kw. West. 2200/3/60 Skinner STEAM.
200 kva. Fair Morse 2400/3/60 4 cyl DIESEL.
225 kw. Elec. Machy 2300/3/60 Ideal STEAM.
300 kw. West. 250 V. D.C. Skinner STEAM.

TURBINE

1—Kerr Steam Turbine 450 BHP 3800 rpm., 5" intake 12" exhaust with Kerr Reduction Unit 3800 to 720 rpm., 115# pressure.

AIR COMPRESSOR

446 cfm Ingersoll Rand 100# 110 lb. AC syn. motor.

SPECIAL BARGAINS

Jeffrey type 43 A, 250 V.D.C. Shortwall Cutter and Loader, 35½" high, 6' undercut, 36" ga. Flameproof motor.

DUQUESNE ELECTRIC & MFG. CO. . . . . PITTSBURGH, PA.

MINE LOCOMOTIVES

5 to 20 ton.

MINING MACHINES

Short and Arc Wall.

STRIPPING SHOVEL

M. G. SETS & ROTARY CONVERTERS

ROTARY DUMP

With weigh pan & scale.

PUMPS and FANS

COAL CRUSHERS

Will buy, sell or exchange. What do you need?

THE INDUSTRIAL EQUIPMENT CORP.

Warehouse: Carnegie, Pa.

P.O. Box 1647 Pittsburgh, Pa.

MINE HOISTS

1—**Vulcan** 30" Band Friction with 50 H.P. electrical equipment.

1—**Flory** 48" Band Friction with 150 H.P. motor and control.

1—**Lidgerwood** Haulage Hoist 60" drum 6000 ft. 1⅛" rope, 300 H.P. electrical equipment.

1—**Vulcan** Cylinder Conical Drum Shaft Hoist, 350 ft. 1⅜" rope with 400 H.P. motor and control.

1—**Nordberg** Cylindro-conical Shaft Hoist, 400 ft. 1½" rope with 600 H.P. motor and control.

And other hoists to suit all mining conditions

Jones Mining Equipment Company

541 Wood Street Pittsburgh, Pa.

ROTARY CONVEYORS

300 KW G.E. SYN. 275 V. HCC, 6 Ph. 60 Cy. 1200 RPM, form P. 2300/4000 V. Transformers.
300 KW G.E. SYN. 575 V. HCC, 6 Ph., 60 Cy., 1200 RPM, form P. 2300/4000 V. Transformers.
300 KW AL-CH SYN. 275 V. 6 Ph., 60 Cy., 1200 RPM, Pedestal type, 2300/4000 V. Transformers.
200 KW WEST. SYN. 275 V., 6 Ph., 60 Cy., 1200 RPM, Bracket type, 2300/4000 V. Transformers.
200 KW AL-CH SYN. 275 V. 6 Ph., 60 Cy., 1200 RPM, Pedestal Type, 2300/4000 V. Transformers.
200 KW R.W. SYN. 275 V., 6 Ph., 60 Cy., 1200 RPM, Pedestal type, 2300/4000 V. Transformers.
150 KW R.W. SYN. 275 V., 6 Ph., 60 Cy., 1200 RPM, Pedestal type, 2300/4000 V. Transformers.

MOTOR GENERATORS

215 KW AL-CH SYN. 275 V., 2300/4000 V., 3 Ph., 60 Cy., 100% P.F., 1200 RPM. Man Switchg'r.
150 KW R.W. SYN. 275 V., 2200 V., 3 Ph., 60 Cy., 100% P.F., 900 RPM. Manual Switchgear.
100 KW WEST. SYN. 275 V., 2300 V., 3 Ph., 60 Cy., 100% P.F., 900 RPM. Manual Switchear.

LOCOMOTIVES

13-Ton WESTGHE, 250 V., 908-C Mts., 36" Ga.
10-Ton GOODMAN, 250 V., 29-A Mts., 36" Ga.
10-Ton GOODMAN, 500 V., 36-B Mts., 42" Ga.
8-Ton WESTGHE, 250 V., 906 Mts., 48"-36" Ga.
6-Ton WESTGHE, 500 V., 904-B Mts.,44"-36"Ga..
5-Ton WESTGHE, 250 V., 902-B Mts., 56½" Ga.
4-Ton WESTGHE, 250 V., 902-C Mts., 36" Ga.
4-Ton GOODMAN, 250 V., 42-I Mts., 44" Ga.

Each unit listed above is owned by us and is available now for immediate purchase.

WALLACE E. KIRK COMPANY

Incorporated

501 Grant Building Pittsburgh, Pa.

FOR SALE

1—One **NORDBERG Hoist** No. 06392, 4 ft. drum, hydraulic brake direct connected 150 h.p., GE motor AC, 440 v. 3 ph. 60 cycle, speed 585, complete with panel board and ammeter.

2—Three **GE** 50 KVA Transformers

3—One **POMONA Vertical Pump,** 75 h.p., AC, 250 v. 60 cy. 3 ph. Westinghouse motor, together with starting compensator, capacity 1000 gal. per min., 200 feet head.

4—One **ALLIS CHALMERS Pump,** type BS 13406, 100 h.p., motor AC, 220 v., 60 cy., 3 ph., capacity 1000 gal. per min., 250 feet head.

5—One **GE MOTOFLOW** model 5KF 404 DWL **Pump** direct connected, 40 h.p. motor AC, 440-220 v., 60 cy., 3 ph., 4" suction, 2" discharge, capacity 300 gal. per min., 340 feet head.

All of the above equipment in first class operating condition

FS-607, Coal Age
520 No. Michigan Ave., Chicago, Ill.

Mine Equipment For Sale

1—Three track tipple and shaker screen.
1—48" Anti-friction conveyor belt complete, 454 ft. centers, 500 tons per hrs. capacity.
1—Link-Belt rotary mine car dump with car feeder.
1—100 ton steel bin.
1—3½ ton capacity weigh basket and Fairbanks Morse Scales, equipped with weightograph.
1—60 cu. ft. automatic dump basket aerial tramway complete, 2 in. track cable 1200 ft. long.
1—100 ton Fairbanks Morse R.R. track scales, 55 ft. deck.
130—3 ton capacity steel mine cars, 14 in. Timken wheels, 30 ins. high, 11 ft. 6 in. long, 66 ins. wide, 42 in. gauge.
9—35A Jeffrey shortwall mining machines, 50 H.P., 250 volts, 42 in. gauge.
1—6 ft. Jeffrey Airvane Fan.

All equipment in good operating condition. For complete information address:

CRESCENT MINING COMPANY

Box 267 PEORIA, ILL.

FOR SALE

1—200 KW **Westg. Syn. Motor Generator Set** 600 V. D.C., Gen., connected to 290 H.P. Synch. motor 3/60/2200 and 900 RPM, with exciters and controls.

5—50 H.P. **G.E.** unused slip ring Type MTC **Hoist & Crane Motors,** 3/60/440 with new controls.

IRON & STEEL PRODUCTS, INC.

13484 So. Brainard Ave., Chicago, Illinois.

"*Anything* containing IRON or STEEL"

BUY FROM A CONCERN BOTH FINANCIALLY AND MORALLY RESPONSIBLE

LOCOMOTIVES

Jeffrey: 10 ton, 500 volt, 44" gauge, 8 ton, 6 ton, and 4 ton, all gauges, 250 volt.

Goodman: All 250 volts.
1—6 ton, 33-I-4T, 44"
1—6 ton, 30B, 48" 1—5 ton.
1—5 ton, W-I-2, 36"

Westinghouse: All 250 volt.
1—4 ton, 902, 48" 1—13 ton, 102, 44"
1—904 c. 44" 500 volt.

G.E.: All 250 volt, 5 ton 825, 44"
6 ton 803, 44", as is 4 ton 1022, 44, as is
6 ton 823, 44" 8 ton 839, 44"

MINING MACHINES

Jeffrey, 35B, 35BB, 29B, and 4—28A 250 V. 2—29C with drop bar support.

Goodman, 12A, 12AB, 12A'A, 12G3A, 124EJ.
1—212G3 250 volt and 2—112DA, 500 volt.
2—Permissible Type 12CA.

Sullivan, CE7, CE9, CE10, CR10 Low Vein and Shearing Machine. AC and DC.

SUBSTATIONS

275 volts, D.C.
1—200 KW **West.** M-G Set.
1—200 KW **Ridgeway** Converter.
100 KW **West.** Rotary Converter
2—150 KW, 2—100 K **Ridgeway** M-G Sets.
1—50 K **GE,** 1, 150 KW **West.** M.G. Sets.
1—150 KW **G.E.** HCC Rotary Converter.

MINE FANS

ALUMINUM

36"—48" and 60" with adjustable pitch blades.

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MINE RAILS

Super-Quality Machine-Reconditioned—not ordinary Relayers.

Fully Guaranteed — shipped anywhere — subject to inspection and approval at your Mine.

NEW RAILS, FROGS & SWITCHES, SPLICE BARS, TIE PLATES, BOLTS, NUTS, SPIKES, GAUGE RODS, OTHER ACCESSORIES

Although our tonnages are not as large as heretofore, most sizes are usually available for prompt shipment.

Every effort will be made to take care of your emergency requirements.

Phone, Write or Wire

L. B. FOSTER CO.
PITTSBURGH - CHICAGO - NEW YORK

SHOVELS & DRAGLINES

1—Model 601 Lima Combination 1½ yard Shovel and 60' Crane Boom equipment with D-13000 Caterpillar Diesel Engine. Excellent condition.

1—Lima 1001 Long Crawler Dragline, 80' Boom, 2½ yard bucket, EKH Hesselman Oil Burning Engine. Excellent condition.

1—Lima 1201 Long Crawler, Dragline, 85' Boom 3 yard bucket, NKH Hesselman Oil Burning Engine. Two years old. Excellent condition.

1—Model 900 P&H Dragline, 100' Boom, 3½ yard Page bucket. 5 Cylinder Fairbanks-Morse Diesel Engine. Machine completely overhauled. A-1 condition.

1—Model 908 Long Crawler Wide Tread Osgood Dragline, 75' Boom, 2 yard Page Bucket, Buda Diesel Engine. A-1 condition.

All these machines located in Pennsylvania.

FRANK SWABB EQUIPMENT CO.
HAZLETON, PA.

One twelve B.U. *Joy, Jr. Loading Machine,* 250 Volts, D. C., permissible 2 15 inch chain *Joy Conveyors,* 300 feet each, 20 H.P., 250 Volts, D. C. permissible.

This equipment is practically new being used to produce only 3376 tons.

Harrison & Quinette Coal Company
Harts Run Road, R.D. 1, Glenshaw, Pa.

LOCOMOTIVE

6 ton Milwaukee—Gasoline
36" Gauge

WEST PENN MACHINERY COMPANY
1210 House Building Pittsburgh, Penna.

For Sale

LIMA 801

70' boom, 2½ yd. Red Arch bucket. Factory rebuilt Waukesha-Hesselman motor also complete dragline at cost of $9,000.00.

Now operating and subject to inspection for delivery about April 1st.

Reason for selling, require larger equipment to increase production. Will make reasonable terms to responsible purchaser or will trade for diesel powered dragline in good operating condition comparable to Monighan 5-W or larger.

THREE COUNTIES COAL CORPORATION
AUGUSTA, ILLINOIS

RAILS—CARS

All sections of rails and good serviceable second hand cars, all gauges, also spikes, bolts, frogs, switches and ties

M. K. FRANK
480 Lexington Ave. New York City
450 Fourth Ave. Pittsburgh, Pa.

FOR SALE

STEEL TIPPLE

Three track Roberts and Schaffer steel tipple with Marcus shaker screen and loading boom, 150 to 200 ton capacity.

Write **FS-595,** Coal Age
330 W. 42nd Street, New York, N. Y.

NEW and REBUILT
STORAGE BATTERY

LOCOMOTIVES

1½ to 10 Ton—18" to 56" Track Gauge

GREENSBURG MACHINE CO.
Greensburg, Penna.

For Sale

Westinghouse — 290 H.P. 2200 volts — 60 cycle — 3 phase **MOTOR GENERATOR SET.**
1—6 ton Jeffrey **LOCOMOTIVE.**

Eastern Hocking Coal Company
98 North Drexel Avenue Columbus, Ohio

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Desirable Electric Equipment—Prompt Shipment From Our Warehouse

750 KW TURBINE
Westinghouse Mixed Pressure 110# H.P. 2 to 4# LP 3600 RPM with gear box to 900 RPM, with accessories.
(Formerly connected to 750 KW 250 v. 900 RPM Gen.)

SYN. MOTORS 3 ph. 60 cy.

HP	Make	V.	Speed
350	Al. Ch.	2200	600
225	Ideal	440	900
1—175	Westgh.	2200	600
2— 75	Westgh.	2200	900
75	Westgh.	220	1800

M-G SETS 3 ph. 60 cy. (Syn.)
150 KW West. 550 v. DC 2200 v. AC—1200 RPM
150 KW Ridgeway 250 V.—2300 V. AC 900 RPM 1 PF
2—100 KW G.E. 250 v.—2300/4000 v. 1200 Rev. 70% P.F.
90 KW Al. Ch. 250 v. 2200 v. AC 900 RPM
75 KW West. 250 v. DC 2200 v. AC 900 RPM

LOCOMOTIVES
5 Ton Jeffrey Storage Battery 42 to 44" Ga. 2 BB motors, Battery box on top.
6 Ton Whitcomb 250 v. 40" Ga.
1—4½ Ton Westgh. 36" Ga. 250 v. with reel
10-Ton West. 250 v. 46/48" Ga.

MINING MACHINES
2—CE 7 Sullivan DC standard 30 HP

SLIP RING & SQ. CG. MOTORS (3 ph. 60 cy.)

HP	Make	Speed	Wdg.	Type
700	G.E.	393	S.R.	MT 432
400	West.	500	S.C.	CS
200	West.	580	S.R.	CW
200	Cr. Wh.	440	S.R.	28
200	Al. Ch.	600	S.C.	
150	West.	720	S.C.	CS
125	Al. Ch.	435	S.R.	
100	F.M.	600	S.C.	BB
100	Lincoln	1200	S.C.	
75	West.	870	S.R.	CW752C
75	West.	575	S.R.	CW868A

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846 cu. ft. 65# Ing. Rand 2 stage ERI
550 cu. ft. 100# Bury 2 stage
355 cu. ft. 100# Pres. Laidlow Dunn Gordon
160 cu. ft. Chic. Pneu. 100#
140 cu. ft. Gardner Rix 100#

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700 GPM 277' DeLaval—75 HP Westgh. Syn.
1—260 GPM 277' Manistee—30 HP Westgh.
2—800 GPM 95' Head Union Steam Pumps.
600 GPM 78' head. Union Steam 25 P GE KET 1200 RPM A.C.

ENGINE GENERATOR SETS
100 KW 250 v. DC Westgh.—Skinner Engine

HOIST
75 HP Ottumwas sgl. fr. drum 36" Dia. 30" wide 8" flanges geared 75 HP CI Westgh. slip ring motor with rev. drum control
75 HP Lidgerwood sgl fr. drum
50 HP Diamond 2 drums same Shaft
30 HP Clyde sgl. drum AC Motor
25 HP Thomas sgl. drum AC Motor
15 HP Lidgerwood sgl. dr. AC Motor

DC MOTORS (230 Volts)

HP	Make	Speed	Type
30	West.	600	S-9
20	West.	900	SK-100L
15	West.	1200	SK
7½ (24)	G.E.	825	CVC

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CONVEYOR and TRANSMISSION BELTING

CONVEYOR BELTING ABRASIVE RESISTANT COVERS

Width	Ply	Top-Bottom	Covers
48"	8	1/8"	1/16"
42"	5	1/8"	1/16"
36"	6	1/8"	1/16"
30"	6	1/8"	1/16"
30"	5	1/8"	1/16"
24"	5	1/8"	1/32"
24"	4	1/8"	1/32"
20"	5	1/8"	1/32"
20"	4	1/8"	1/32"
18"	4	1/8"	1/32"
16"	4	1/8"	1/32"
14"	4	1/16"	1/32"
12"	4	1/16"	1/32"

TRANSMISSION BELTING HEAVY-DUTY FRICTION SURFACE

Width	Ply	Width	Ply	Width	Ply
18"	6	10"	6	6"	5
16"	6	10"	5	5"	5
14"	6	8"	6	4"	5
12"	6	8"	5	4"	4
12"	5	6"	6	3"	4

ELEVATOR BELTING HEAVY DUTY RUBBER COVERED

Width	Ply	Top-Bottom	Covers
12"	6	1/16"	1/16"
14"	6	1/16"	1/16"
16"	6	1/16"	1/16"
18"	6	1/16"	1/16"

ENDLESS "V" BELTS
"A" — WIDTH — All Sizes
"B" — WIDTH — All Sizes
"C" — WIDTH — All Sizes
"D" — WIDTH — All Sizes
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Sold In Matched Sets

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ALL SIZES FOR AIR — WATER — STEAM — SUCTION — FIRE — WELDING ETC.

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SUB STATIONS
1—300 KW West. Syn. MG Set, 275 v. DC 900 RPM.
1—200 KW West. 600 v., otherwise same as above.
1—150 KW West. 275 v. DC, same as above.
1—200 KW West. Rotary Converter, 275 v. DC, 2300 v. AC.
1—100 KW West. same as above.

MINE LOCOMOTIVES
1—13 ton G.E. with HM 829 250 v. ball bearing motors.
1—10 ton Jeffrey, MH 110 250 v. motors.
1—10 ton, same as above with 500 v. motors.
2—8 ton West. Bar Steel Frame, 906 mtrs.
3—6 ton Jeffrey, MH 88 250 or 500 v. mtrs.

CUTTING MACHINES
2—35BB Jeffrey, 250 v. permissible.
1—35BB Jeffrey, 500 v. permissible.
1—35BB Jeffrey, 250 v.
1—35BB Jeffrey, AC Shortwall.
1—36B Jeffrey, Low-vein, 250 v.
1—212G3 Goodman Low-vein AC.
1—12G3 Goodman AC Shortwall.
1—12AB Goodman, 210 v. DC.
1—29B Jeffrey Arcwall DC.
1—29C Jeffrey Arcwall, 250 v. DC.

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WAYNE, WOOD COUNTY, OHIO Near Toledo

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All Sizes—Reconditioned
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Wyckoff Wood Pipe has an 85 year record of perfect resistance to the corrosive action of sulphurous mine water. It is an ideal, long-time investment—light, easy to lay, and relatively low in first cost

We also manufacture a special Hard Maple Pipe for flushing culm in the Anthracite Region and wood covering for underground steam lines.

shipments from stock day after receipt of order. Send for catalog.

Established 1855

Emergency orders can be delivered by Truck to Mines in Pennsylvania Coal Fields following morning after receipt of same.

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Office and Factory

No. 35 Home Street, Elmira, N. Y.

The Originators of Machine Made Wood Pipe

FOR long rope life make certain your sheaves are of hard, wear-resisting metal. Soft sheaves wear rapidly. Once worn (and often corrugated) they both pinch the rope and develop a filing action. *Never put a new rope on a worn, scored or corrugated sheave.* Select the proper sheave material, depending on the rope pressures encountered. Any American Cable engineer will gladly give you the benefit of his long experience.

And sheave diameters are very important too. *If the sheave is too small, the sharp bend imposed upon the rope induces high bending fatigue and early rope destruction.* To appreciate the importance of using correct diameters note that a 1″ rope of 6 x 7 construction requires a 42″ sheave while a 1″ rope of 6 x 41 construction requires but an 18″ sheave.

For average operations here is a table setting forth the proper minimum sheave diameters for ropes of varying constructions:

for 6 x 7 Construction	42 times diameter of rope
for 6 x 19 Seale Construction	34 times diameter of rope
for 6 x 16 Filler Wire Construction	30 times diameter of rope
for Flattened Strand (Type B & G)	30 times diameter of rope
for 8 x 19 Seale Construction	26 times diameter of rope
for 6 x 19 Filler Wire	26 times diameter of rope
for 6 x 22 Filler Wire	23 times diameter of rope
for 8 x 19 Warrington	21 times diameter of rope
for 8 x 19 Filler Wire	21 times diameter of rope
for 6 x 37 Seale	18 times diameter of rope
for 6 x 41	18 times diameter of rope

Paying attention to your sheaves pays dividends in longer rope wear, less trouble and steadier production. Specifying **TRU·LAY PREFORMED** pays dividends in the same way. Consult your nearest American Cable wire rope engineer. All American Cable ropes made of Improved Plow Steel are identified by the Emerald Strand.

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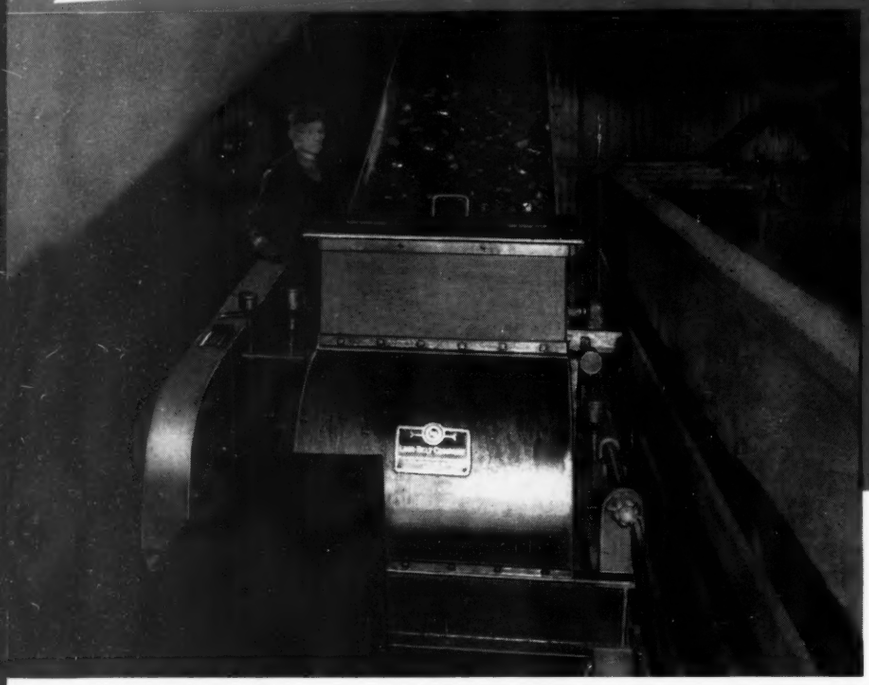
MORE PREMIUM SIZES

LESS DEGRADATION
LESS OVERSIZ
WITH THE

LINK-BELT 2-ROLL COAL SIZER



On Anthracite

Hudson Coal Company, who recently installed the 30″ x 36″ Link-Belt 2-Roll Sizer illustrated above, reports as follows regarding its performance: "Variations in market requirements require frequent changes in the size of our crushed product. The mechanism for quick adjustment allows us to make these changes without appreciable delay. Your sizer is a very practical machine for our purpose in sizing material which we receive in our crushing plant."

Size tests recently made show the following results. This is from a feed of stove and nut, 2 7/16″ x 13/16″:

Size	Test No. 1 Roll Setting 30 1/8″	Test No. 2 Roll Setting 30 3/4″
Chestnut +1″	7.5%	18.0%
Chestnut +13/16″		37.0%
Pea +9/16″	34.0%	26.0%
Buck +5/16″	32.5%	11.0%
Rice +3/16″	12.0%	4.5%
Barley +3/32″	8.0%	2.5%
Silt +1/16″	3.0%	0.5%
Silt —1/16″	3.0%	0.5%
Total Pea and Larger Sizes	41.5%	81.0%
Total Steam Sizes	58.5%	19.0%

On Bituminous

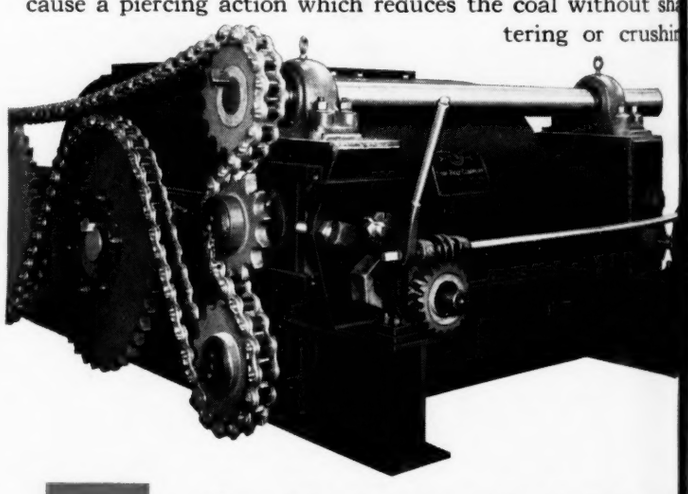
A performance test, as shown in the table below, with two different roll settings, varying only by 3/16″, illustrates conclusively the extreme accuracy of size-control obtainable with this machine. Here the job was to produce a minus 1″ square mesh product from a 2″ x 1″ feed.

	With 29 3/4″ Roll Settings	With 29 15/16″ Roll Settings
Plus 1″ sq. mesh (Oversize)	0.02%	14.65%
1″ x 3/4″ thru sq. mesh	21.93%	45.40%
3/4″ x 1/2″ thru sq. mesh	36.24%	20.84%
1/2″ x 1/4″ thru sq. mesh	22.22%	10.30%
1/4″ x 1/8″ thru sq. mesh	8.70%	4.20%
1/8″ x 0″ thru sq. mesh	10.89%	4.61%

Look at this result: Where the desired products were 1″ x 3/16″ and 3/16″ x 0″ from a feed of 3″ x 1″ coal, another performance test showed—77.3% of 1″ x 3/16″—17.0% of 3/16″ x 0″—the balance, only 5.7% oversize. These are but a few examples of results being obtained from Link-Belt Sizers in many coal fields throughout the country.

8779

● You can reduce costs when producing stoker-sizes fr larger-sizes and at the same time decrease oversize and und size by the installation of the popular Link-Belt Sizer. many exclusive and practical features, developed from ye of research and experience, have proved advantageous operators in many coal fields. Scientifically-spaced, accurate meshed pyramidal teeth, combined with a low roll spe cause a piercing action which reduces the coal without sh tering or crushi



New Mechanical Roll Adjust

—Gives Greater Flexibility —Saves Time—Increases Output

Where frequent adjustments of roll settings are requir d, c siderable saving can be made with the Link-Belt me hani roll adjuster which is available in two types—power a d h operated. (Hand operated type illustrated.) Let us ell y more about this feature of the Link-Belt 2-Roll Siz r.

LINK-BELT COMPANY, Chicago, Philadelphia, Pittsburgh, Wilkes-Barre, Hunting , W
Denver, Kansas City, Mo., Indianapolis, Cleveland, Detroit, St. Louis, Seattle, Toronto, anc